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PSYCHE

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NOTES ON THE HABITS OF SOME CENTRAL AMERICAN STINGLESS BEES.[1]

By William Morton Wheeler.

While collecting insects in Central America during the winter of 1911–'12, I was impressed with the great diversity of behavior among the Meliponine, or stingless bees of the genus *Trigona*. Prof. Cockerell has had the kindness to study and identify the specimens I collected and as his paper appears in this number of Psyche it seemed opportune to publish my field notes at the same time. These notes comprise only such observations as I was able to make while devoting most of my attention to other insects and therefore contain little on the internal structure of the nests, which can be studied only at the expense of much time and labor. This part of the subject, however, has been ably treated by two observers in South America, Silvestri.[2] and H. von Ihering[3] Ducke has also contributed some notes on the Brazilian Meliponinæ, especially on the flowers which they visit.[4]

The observations of these authors are cited, because several of the Trigonas of Central America are also members of the South American stingless bee fauna.

Trigona amalthea Olivier.

A large colony of this black species was found nesting in the base of a tree near Escuintla, Guatemala. The nest was situated a few feet from the ground and had a rather convoluted, spout-shaped entrance of black wax (cerumen) projecting between two of

[1] Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University. No. 61.

[2] Contribuzione alla Conoscenza dei Meliponidi del Bacino del Rio de la Plata, Riv. Patol. Veget. X, 1902, pp. 121–170, 2 pls.; 19 text figs.

[3] Biologie der stachellosen Honigbienen Brasiliens. Zool. Jahrb. Abth. f. Syst. XIX, 1903, pp. 179–287, 13 pls., 8 text figs.

[4] Die Stachellosen Bienen (*Melipona* Ill.) von Pará. Zool. Jahrb. Abth. f. Syst XVII, 1902, pp. 285–328, 1 pl.)

the tree's buttresses. The colony was apparently about to swarm, as the air about the nest was full of bees flying back and forth in zig-zag paths like those described by some dancing Empidid flies. A compact mass of the insects had settled to one side of the entrance spout. On putting my tweezers into this mass I was at once enveloped in a cloud of loudly humming bees, which, however, did not settle on my body but kept darting against my face and hands, often falling over on their backs onto the ground or onto my clothing. They moved very rapidly and as if intoxicated. At the same time they emitted a distinct rancid-butter odor, like that of the ants of the genera *Tapinoma* and *Azteca*. On my moving away to a distance of about 40 feet, they all left me quite suddenly and returned to their nest.

According to Silvestri, this species may also bite, but its mandibles are feeble and innocuous. Von Ihering describes it as a "very wild" bee and as often visiting carrion, cow-dung or other excrement. He gives its native Brazilian name as "sanharó."

Trigona nigerrima Cresson.

A few specimens of this, the largest species seen, were taken on flowers in the banana plantations at Quirigua, Guatemala.

Trigona jaty F. Smith.

This small, slender, honey-yellow species is common in western Guatemala, at Escuintla and Patulul, nesting in crevices between the buttresses or bark-ridges of large trees and between the clap-boards of houses. In the latter situations it seems to prefer the corners where the clap-boards abut on the door and window frames. The nest entrance is a spout, sometimes fully an inch long but only about the diameter of a lead-pencil, either cylindrical or somewhat flattened and occasionally twisted. The wax of which this spout consists is pale yellow and as thin as paper, so that it collapses when rudely touched, especially when the temperature is high. In the early morning the bees are often seen flying in a small compact swarm just in front of the entrance, all with dangling legs and with their faces turned towards the opening. They are extremely timid and when disturbed at once retreat into the opening and cannot be induced, by poking straws, etc. into it, to come out and defend their nest. The natives of Guatemala call these little bees

which are common about the houses, "ingleses," *i.e.* Englishmen, "because they wear black leggings." [1]

Silvestri gives a good description of the nest of *T. jaty* and says that a colony yields about $\frac{1}{4}$ litre of very sweet and aromatic honey. Both he and von Ihering, who also gives a detailed account of its nest, call attention to its very timid behavior. He records the interesting fact that it usually closes its nest spout at night with a convex waxen door, which is removed in the morning.

Trigona pallida Latreille.

This light-yellow species was common at a spot near Gatun, C. Z. on the relocated Panama R. R., where it exhibited a most extraordinary habit. At a wet ravine on one side of the track a barrel of black crude oil (with asphalt basis) had been placed as a supply for the men employed in exterminating mosquito larvæ and pupæ, and near it was a bucket which had been filled from the barrel. Perched around the rim of this bucket and crawling about the leaking spigot in the flat end of the barrel were great numbers of the bees, loading themselves with the oil! They could be seen collecting the oil with their fore legs and then transferring it to their dilated hind tibiæ. In this occupation many had succeeded in daubing their whole body, including the wings, with the sticky, strong-smelling substance, and at first sight seemed to be trying to convert themselves into pitch-black Trigonas. They were not, of course, really endeavoring to adopt the prevailing style of coloration among the Central American species, but were merely collecting the oil for the purpose of kneading it up with their own waxy secretions, to form the cerumen with which they build their honey pots, brood-combs and nest entrances.

Trigona cupira F. Smith.

A single colony of this black species was discovered by my wife in an orchard at Zacapa, Guatemala, nesting in the ground. The orifice, about an inch in diameter was made of clay and was arched like the door of an oven. It was guarded by a number of workers, all sitting with their faces towards the outside. When I broke into the nest with my trowel, the bees attacked me furiously,

[1] Possibly the reference is to "shoes" instead of to "leggings," since the native Guatemalans go bare-footed.

humming loudly and getting into my hair, eyebrows, moustache, eyes, ears and nostrils and biting my neck. Their jaws, however, were very feeble and the attack was far more ludicrous than disagreeable. At Guatemala City, in the bottom of one of the deep barrancas which nearly surround the town, I saw many workers of this same species collecting moist mud at the edge of a stream.

According to Ducke, *T. cupira* is common in Pará, especially on Papilionaceæ and Mimosaceæ. It works during the cooler hours of the day, *i. e.* in the morning and in the evening. He remarks that it has a pleasant odor like that of roses and that its honey is palatable and wholesome. Both Silvestri and Ducke maintain that it nests in trees as well as in the ground. The former saw it licking up the honey dew discharged by some Homoptera (*Æthalion reticulatum* L.) living on willows. Von Ihering gives a full description of the nest and records the native Brazilian name of this bee as "iraxim."

Trigona perilampoides Cresson.

A few workers of this species were taken on flowers near Esquintla, Guatemala.

Trigona fulviventris Guérin.

Single workers were taken on flowers at Zacapa and at Puerto Barrios, Guatemala. Prof. Cockerell has sent me a specimen of this bee taken at Guatemala City by Mrs. W. P. Cockerell.

Trigona frontalis Friese.

This is a very small species, measureng scarcely more than 3 mm. in length. It was found nesting in the narrow cracks of the wooden pillars of the corridor surrounding the "patio" of a hotel at Patulul, Guatemala. Each colony comprises only a few dozen workers, which close the crack with a diaphragm of pale yel ow wax and leave a round hole only 1.5–2 mm. in diameter, just large enough to permit them to enter or pass out one at a time. They are extremely timid, hastily retir ng into the nest at the slightest sign of danger and remaining in it many minutes before again venturing forth. By tearing away the diaphragm with the points of my tweezers I was able to watch the bees with a pocket lens in the act of reconstructing it from the inside. This they accomplished in about 20 minutes. Again and again I tore down their

work but they rebuilt it each time, till finally, after spending some hours in this destructive employment, my patience was exhausted and I left the little creatures to enjoy their harmless and unobtrusive existence.

Trigona townsendi Cockerell.

The single specimen of this minute bee, which was submitted to Prof. Cockerell, was taken from a nest of *T. frontalis* at Patulul, Guatemala together with several workers of this latter species. It is therefore, in all probability, an inquiline, which, like so many inquilinous or parasitic bees and ants, resembles its host in size and coloration.

Trigona stigma F. Smith.

I saw a populous colony of this singular, slender bee nesting in the trunk of one of the large poisonous manzanilla trees which are common along the sea-beach at Las Sabanas, near Panama City. The entrance of the nest, which was about six feet above the ground, was a slit-shaped hole about $\frac{1}{2}$ inch long and not provided with a waxen or cerumen spout. When I discovered the nest, a compact swarm of the insects was poised in the air at the entrance, all oriented with their heads towards the hole and their long hind legs dangling. On being disturbed they made no attempt to attack me. By sweeping my hand through the swarm I could collect large numbers, but my hand became very sticky with a colorless propolis which the insects were carrying on their hind legs. A few hours later, when I again passed the tree, the swarm had disappeared. In life the slender abdomen of this bee is of a peculiar livid white color, but in dried specimens it often turns black like the remainder of the body.

Trigona bipunctata wheeleri Cockerell.

At Patulul, Guatemala, I came upon a colony of this species nesting in the trunk of a large *Acacia*. The entrance spout was made of yellowish brown cerumen. When disturbed, the bees flew at me but, to my surprise, they neither settled on nor bit my face and hands but rested amicably on my skin and clothing, till I had walked a few paces from the nest, when they all left me. This bee was frequently seen about Escuintla visiting human excrement along the railroad tracks and carrying it away for use in the manu-

facture of cerumen. At Patulul I saw it similarly engaged in large numbers in an open latrine. This, as also the similar habit of *T. ruficrus corvina* described below, raises the question as to whether some of the baneful effects recorded by South American observers as the result of eating the honey of stingless bees, may not have been due to pathogenic bacteria which had been worked by the bees into the cerumen walls of their honey pots and had contaminated their contents. At any rate, from what I have seen of this bee at Escuintla and Patulul, I have no doubt that, under certain conditions, it might become, like the house fly, a menace to public health through disseminating the germs of typhoid and other enteric diseases.

According to Silvestri, the typical *T. bipunctata* is called "tombuna," "mandaguay," or "tapezuá" by the natives of the La Plata Basin. The spout of the nest is described as being 8–15 cm. long and 3–5 cm. broad. Von Ihering gives the native Brazilian name of this bee as "tubuna" and calls attention to its hair-twisting proclivities. He says that it often annoys people also by alighting on their skin far from the nest and imbibing their perspiration. He notices its fondness for visiting carrion and excrement and its disagreeable odor.

Trigona pectoralis Dalla Torre.

A single colony of this bee was found nesting a couple of feet from the ground in the hole of a large tree growing on the bank of a very shady ditch near Escuintla, Guatemala. The entrance had a well-defined cerumen spout about an inch long. When disturbed the bees assaulted me and buzzed about in my hair, moustache and eyebrows. They all left me as soon as I had moved about 20 feet from the nest.

Trigona pectoralis panamensis Cockerell.

At Ancon, C. Z. this species was seen visiting the yellow flowers of a great curcurbitaceous vine which covers the entrance to the Hotel Tivoli. The bees were very numerous early in the morning and seemed to prefer the wilted and partially closed flowers. By 10 a.m. they had all diappeared and did not revisit the flowers till early the next morning.

Trigona ruficrus Latreille.

While collecting along the edge of a field near Zacapa, Guatemala, I found a huge nest of this species, lying on the ground at the foot of a tree from which it had been torn. At first sight this nest resembled that of a common termite (*Eutermes ripperti*), being elliptical, nearly 2 feet long and more than a foot wide and made of a dark, dry, earthy cerumen. My attention was attracted to it by columns of large leaf-cutting ants (*Atta cephalotes*) and fire ants (*Solenopsis geminata*). On following these I found that the nest had been torn open by some of the natives and that it contained a colony of *T. rufricus* which had been robbed of its honey. The ants were completing the ruin by imbibing the remnants of the honey and carrying off the softer and sweeter portions of the cerumen in little lumps. The defenceless bees had not deserted their abode but were vainly trying to repair the damage. They did not attempt to attack me.

Silvestri gives "irapuá" and "carabozá" as the native names of this bee in the province of Missiones. He describes and figures the structure of the nest in detail, and says that the bees bite savagely but without inflicting any pain. The honey is said to be purgative. Von Ihering gives the native Brazilian name of the insect as "irapoán." He also describes the nest in detail and states that the honey is "blackish brown, opaque, odorless, of unpleasant, nauseating, acridly sour taste, with strong acid reaction."

Trigona ruficrus corvina Cockerell.

This bee was seen near San José, Costa Rica and at Corrozal in the Canal Zone, busily collecting the sticky propolis from the surfaces of young orange leaves. But this insect is not always engaged in such cleanly work. At the garbage crematory at Gatun, C. Z. I saw it in great numbers mingling with the houseflies and blowflies inside the empty garbage barrels where it was collecting the malodorous moisture that still clung to the wooden staves. The honey of this bee, like that of *T. bipunctata*, *amalthea*, *argentata* and probably several other Central and South American Trigonas, may, therefore, be as unwholesome an article of human food as would be honey collected by houseflies, if these scavengers should suddenly become social and take to storing such a substance.

Trigona flaveola mediorufa Cockerell.

I found a colony of this beautiful fulvous bee at Escuintla, Guatemala, about four feet from the ground in the trunk of a large tree. There was no cerumen spout to the nest entrance which was a hole about $\frac{3}{4}$ inch in diameter, guarded by a company of workers, all with their shining yellow faces directed towards the outside. On carelessly thrusting my tweezers into the opening I was given a surprise for which my previous experiences with stingless bees had not prepared me. They rushed at my face, neck and hands in a compact swarm, emitting a scalding liquid which had the rancid-butter odor of the ants of the genus *Tapinoma*. They bit my ears and nearly blinded me by getting into my eyes, so that I had to beat a hasty retreat. Only after I had moved about 30 feet from the nest did they all leave me and return to settle down again in the nest entrance in the defensive attitude in which I had first seen them. The action of the liquid on my skin was very annoying, for all the spots on my cheeks, eyelids and hands which the bees had moistened, remained sensitive and painful to the touch for several days and in the course of the next two weeks lost their epidermis as if violently sun-burned.

T. flaveola mediorufa belongs to a group of Trigonas popularly known in Brazil as "cagafogos" (literally "fire-defecators") and including *T. tataira* Smith (*cacafogo* F. Müller) and the typical *flaveola* Friese. There seems to be considerable difference of opinion as to the source of the scalding liquid with which these insects so efficiently defend their nests. Von Ihering did not observe the Brazilian species *T. tataira*, but assumes from the statements of other observers "that the bee bites a small hole in the skin with its mandibles and then injects the secretion of its poison glands into this wound. In this manner arises a red spot 1 mm. in diameter, where the epidermis is lacking. It takes one or two weeks for the little wound to heal completely." Silvestri describes his experience with the typical *T. flaveola* Friese, which he calls the "cagafoga" as follows: "I came upon a nest of this species in a dead tree trunk near the River Cuyabá. On approaching it I was assaulted by a few of the bees, which bit various parts of my head. As these bites produced a slight burning sensation and as I was not provided with protective apparatus, I deemed it imprudent to expose myself to the attack of a greater number of

individuals. The burning sensation of the bite is due to the nature of the saliva, which seems to contain a great deal of formic acid; at any rate, the odor reminded me strongly of that substance."

One is, of course, hardly in a proper frame of mind during an assault of these terrible bees to make accurate observations on the source of their caustic secretion. I am convinced, nevertheless, that the liquid, of *T. flaveola* at least, comes from the posion (anal) glands and not from the mouth as Silvestri supposes, because the odor is precisely like that of the poison glands of the Dolichoderine ants (*Tapinoma*, *Azteca*, *Liometopum*, etc. and of some other insects with anal glands [Carabidæ]). The secretion is not, however, applied in the manner described by von Ihering, because the bees did not make small holes in my epidermis, but simply spread the liquid over it in considerable quantity, so that the surface was quite wet. Hence, after the attack, the cuticle was not reddened in definite small patches but was diffusely flushed over larger areas as in case of sun-burn.

MELIPONINE BEES FROM CENTRAL AMERICA.

By T. D. A. Cockerell.
The University of Colorado, Boulder, Colo.

When recently travelling in Central America, Dr. W. M. Wheeler collected and made observations on a number of interesting species of Meliponinæ. The specimens obtained were kindly sent to me for study, and are reported on herewith.

Trigona amalthea (Olivier).

Escuintla, Guatemala, Dec. 28, 1911 (No. 2); Las Sabanas, Panama, Nov. 1911 (No. 17). This is *T. fuscipennis* Friese. The "*amalthea*" of Friese and Silvestri is *T. silvestriana* Vachal (*T. friesei* von Ihering).

Trigona nigerrima Cresson.

Quirigua, Guatemala, Nov. 1911.

Trigona jaty Smith.

Escuintla, Guatemala, Dec. 30, 1911; Patulul, Guatemala, Jan. 1, 1912.

Trigona pallida (Latreille).

Gatun, Panama, Canal Zone, Nov. 11, 1911; Las Sabanas, Panama, Nov. 1911.

Trigona cupira Smith.

Guatemala City, Guatemala, Dec. 1911; Zacapa, Guatemala, Dec. 15, 1911 (No. 10). A male from San José, Costa Rica, Dec. 27, 1911 (No. 8) evidently belongs here; it has a narrower face than the female, and the clypeal markings are obscure.

Trigona perilampoides Cresson.

Escuintla, Guatemala, Dec. 28, 1911.

Trigona fulviventris Guérin.

Zacapa and Puerto Barrios, Guatemala.

Trigona townsendi Cockerell.

Patulul, Guatemala, Jan. 2, 1912, one specimen (No. 19). This

minute species has hitherto been known only from Peru. Face all black.

Trigona frontalis Friese.

Patulul, Guatemala, Jan. 2, 1912, one specimen. Face-markings, white.

Trigona stigma Smith.

Las Sabanas, Panama, Nov. 1911 (Nov. 14). In several specimens the abdomen is yellowish white except at apex; in others dark brown. This is, I believe, due to immaturity. A specimen from Sangre Grande, Trinidad, March 16, 1912 (*H. Scott*) is considered to be the hitherto unknown male of this species. It is like the worker, but with longer antennæ, and the anterior orbits are very narrowly margined with creamy-white. Dr. Friese, to whom a specimen of this species was submitted, considered it undescribed, but it agrees exactly with Smith's description of *stigma*.

Trigona bipunctata wheeleri subsp. nov.

Worker. Smaller, length hardly 4½ mm.; wings suffused with orange ferruginous, the color especially bright and strong in the costal region. Known from other black Guatemalan species by the color of the wings, a variable light spot at each side of the clypeus, and the upper part of the clypeus with a variably distinct keel. The mandibles are bright red at apex. *T. bilineata* Say, from the Rio Nautla, Mexico (Townsend) is hardly to be considered a distinct species, but it has not the orange wings, and does not closely resemble the present insect.

The new form is from Escuintla, Guatemala (type locality), Dec. 20, 1911 (No. 11); Patulul, Guatemala, Jan. 8, 1912. Twelve specimens in all.

Dr. Friese, who examined a specimen of this species, referred it to *T. mexicana* Guérin. I have what I consider to be *T. mexicana* from the Rio Nautla, Mexico (*Townsend*); it has greyish-hyaline wings, and is distinct from the present insect.

Trigona pectoralis (Dalla Torre).

Escuintla, Guatemala, Dec. 27, 1911 (No. 5). Professor C. F. Baker sent me specimens of this species from San Marcos, Nicaragua, labelled *T. dorsalis* Sm., det. Friese. I have a true *dorsalis* from F. Smith's collection; it has a long abdomen, and is evidently distinct from *pectoralis*.

Trigona pectoralis panamensis subsp. nov.

Worker with the long pollen-collecting hairs of hind tibiæ all black (in typical *pectoralis* they are entirely pale red).

Las Sabanas, Panama, Nov. 1911, two workers (No. 15).

Trigona n. sp.(?).

Gatun, Panama, Canal Zone, Nov. 11, 1911. A worker in very bad condition; resembles *T. fulviventris* Guér., but the legs are red, and the hair of head, thorax and legs is entirely fulvous; the mesopleura is also evidently red. So far as can be made out the species is new, but it cannot be described properly without fresh material.

Trigona ruficrus (Latreille).

Zacapa, Guatemala, Dec. 13, 1911.

Trigona ruficrus corvina subsp. nov.

Worker with hind tibiæ and tarsi black. Larger than *T. amalthea;* wings very dark; mandibles red.

Zacapa, Guatemala (type locality), Dec. 12, 1911 (No. 3); San José, Costa Rica, Dec. 27, 1911; Gatun, Panama, Canal Zone, Nov. 11, 1911 (No. 7.); Las Sabanas, Panama. Dr. Friese would not separate this from *T. fuscipennis*, but it has red mandibles, and in my opinion belongs with *ruficrus* rather than with *amalthea* (*fuscipennis*).

Trigona nigra Cresson = *cressonii* Dalla Torre.

This is not in Dr. Wheeler's collection, but I take the opportunity to note that specimens from Belize, sent by Prof. C. F. Baker, are labelled *T. hyalinata* Lep., det. Friese.[1] It is however plain from Lepeletier's description that they cannot be that species.

Trigona flaveola mediorufa subsp. nov.

Worker. Length about 5½ mm.; orange-ferruginous and black; head extremely large, broader than throax, pale ferruginous, the face suffusedly light yellowish-testaceous; ocellar region black, the black variable in amount, with or without lateral processes; clypeus with a transverse black subapical line; front and face almost hairless, front brilliantly shining, face (with clypeus) finely sculptured with

[1] Professor Baker's species labels were large, and I replaced them by smaller ones. I do not now recall whether "det Friese" was on the original labels, or was placed there by me on the basis of information sent separately.

quite dense microscopical punctures; mandibles pale reddish testaceous, with a black basal tubercle, the margin dentate only at the inner corner; scape pale ferruginous, with the apical part darkened; flagellum dark with the apical margins of the joints ferruginous beneath; mesothorax moderately shining, with rather coarse and abundant hair, which is red on the red parts, but mainly fuscous on the back; middle third of mesothorax (broader behind) clear ferruginous, lateral third black, but the lateral margins narrowly ferruginous; scutellum ferruginous with a dark basal spot; pleura and metathorax black, with partly reddish and partly fuscous hair (fuscous in front and beneath); prothorax orange-ferruginous with a black stripe on each side; tubercles ferruginous; tegulæ large, pale yellowish red; wings hyaline, yellowish basally, stigma and nevures light orange-ferruginous; legs reddish-black, with the following parts red or yellowish-red, anterior femora in front, and apically behind, with more or less of a stripe down lower side, anterior tibiæ in front and a broad stripe down outer side, apices of the tarsi, middle and hind trochanters above, and spot at apex of middle femora; hairs of the not greatly broadened hind tibiæ black; abdomen rather short and narrow, shining clear orange-ferruginous, the apical segments with coarse hair, which appears black in some lights and reddish in others, but that of last segment always appears red; hair on inner side of basitarsi red, shining, brilliant red-golden.

Hab.—Escuintla, Guatemala, three taken Dec. 30, 1911. (*W. M. Wheeler*, 30). Not very close to any species known to me by specimens or descriptions, but it may be compared with *T. tataira* Smith (*coccofago* H. Müller; *cacafago* F. Müller), from which it differs by the much broader face, much longer scape, color of the legs, etc., (a cotype of *tataira* compared). Since writing the above, I have been informed that Dr. Friese considers this to be his *T. flaveola*. As however *flaveola* was described as "ut *cacafago*, sed thorace ferrugineo, femoribus ferrugineis; alis hyalinis, basi fuscata, pterostigmate flavido, cellula radiali hyalina." I think I am justified in considering our insect at least subspecifically distinct.

The following table will facilitate the separation of the species discussed above:

Mesothorax and scutellum densely rugosopunctate; axillæ pale, as also the bidentate apex of scutellum ..... *perilampoides* Cress.
Not thus sculptured and marked 1
1. Wings blackish, with the apex white; small black species ..... *cressoni* (D.T.)
Wings not thus colored 2
2. Minute, length 4 mm. or less 3
Larger, over 4 mm 4
3. Larger; face with white markings ..... *frontalis* Friese
Smaller; face all black ..... *townsendi* Ckll

4. Legs bright ferruginous 5
   Legs mainly (*mediorufa*) or wholly black or brown, dark 7
5. Mesothorax wholly red ..... *pallida* (Latr.)
   Mesothorax black, or almost entirely so 6
6. Hind tibiæ with hair all red ..... *pectoralis* (D. T.)
   Hind tibiæ with conspicuous black hairs ..... *pectoralis panamensis* Ckll
7. Head and thorax black; abdomen orange; wings dusky reddish *fulviventris* Guér.
   Not so colored 8
8. Wings with bright ferruginous costa 9
   Wings without red costa 10
9. Abdomen orange-ferruginous; head very large ..... *flaveola mediorufa* Ckll
   Abdomen black ..... *bipunctata wheeleri* Ckll
10. Wings white or clear hyaline, stigma light ferruginous; abdomen long and narrow, often pale ..... *stigma* Smith
    Wings dark or dusky; abdomen ordinary 11
11. Large; anterior wing about 9.5 mm. long ..... *nigerrima* Cress.
    Smaller 12
12. Face broad, without light markings 13
    Face with light markings ..... *cupira* Smith
13. Mandibles dark ..... *amalthea* (Oliv.)
    Mandibles red 14
14. Hind tibiæ and tarsi red ..... *ruficrus* (Latr.)
    Hind tibiæ and tarsi black ..... *ruficrus corvina* Ckll

MALLOPHAGA FROM BRAZILIAN BIRDS.[1]

By John H. Paine and William M. Mann.

We have recently received from Dr. E. Snethlage, director of the Division of Zoölogy at the Museu Goeldi at Pará, the small, but very interesting collection of Brazilian Mallophaga listed herewith. The specimens were taken by Dr. Snethlage from birds collected by her. The identifications of the birds are from the same source.

Goniocotes verrucosus Taschenberg. (Fig. 1).

Two specimens, male and female, of this curious form from *Crypturus tataupa* Temm. (Marajo, Brazil. Nov. 1911). So far as we know, this is the first record of the female of this species. It is considerably larger than the male, especially as regards the length of abdomen. Peculiar to this species are the curious, dark, semi-circular scales, attached to the dorsal surface of the insect by their lateral edges, and arranged in double and single rows on the thorax and abdomen. (Fig. 1b). We figure the female, in outline, Taschenberg's figure of the male being rather indefinite and lacking in detail.

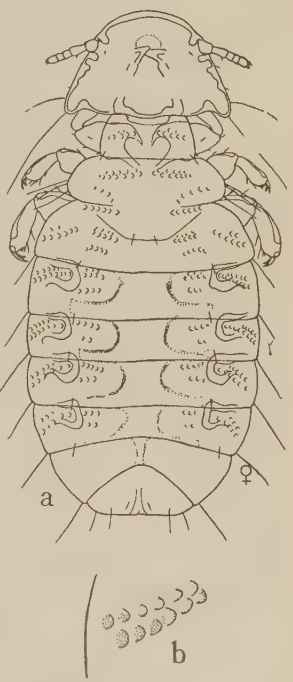

Fig 1. *Goniocotes verrucosus* Tasch.

Measurements.

	Length: ♀, 1.34	Width:
Head	.29	.42
Thorax	.24	.42
Abdomen	.86	.62

Goniodes complanatus Piaget.

Nine specimens, male and female, from *Crypturus tataupa* Temm. (Marajo, Brazil, Nov. 1911). The head of this species

[1] Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University. No. 64.

bears a close resemblance to certain members of the genus *Nirmus*. The lobes of the last segment of the abdomen in the female do not appear so prominent as in Piaget's figure.[1]

Goniodes coniceps Taschenberg. (Fig. 2).

Two male and seven females from *Crypturus tataupa* Temm. (Marajo, Brazil, Nov. 1911). This is apparently the first record of the female of this species. It is larger than the male, which however, is considerably smaller than the type of the species. The first segment of the antenna of the female is somewhat shorter than that of the male (Fig. 2, c-d); the abdomen is also much broader. We also figure the last segments of the male (Fig. 2b).

Fig. 2. *Goniodes coniceps* Piaget.

Measurements.

♀, length: 1.56		Width:
Head	.46	.60
Thorax	.28	.60
Abdomen	.90	.80
♂, length: 1.40		Width:
Head	.42	.58
Thorax	.27	.57
Abdomen	.80	.72

Goniodes pennaticeps sp. nov. (Fig. 3).

One male specimen from *Anthus lutescens* Puch. (Marajo, Brazil, Nov. 1911). This species belongs to the group of *G. laticeps* Piaget and of *G. aliceps* Nitzsch, closely resembling the latter, but differing strikingly in size, the present species being less than

[1] Piaget, E. Les Pédiculines, II, Pl. XXI, fig. 8. (1880).

half as long. Carriker[1] lists and figures a form under the name of *G. laticeps* Piaget which, from his figure, is apparently *G. aliceps* Nitzsch.

Description of male: Head broadly conical, broader than long, with rounded front; three minute hairs on the clypeus on each side and two more prominent pustulated ones on the dorsal surface near the center. Notch for the reception of the antennæ distinct but not deep; antennæ situated well forward, with first segment longest and broadest; second segment longer than those following, fourth shortest and third and last of about equal length; last segment truncate. Antennal bands prominent, extending from margin before the antennæ in to the mandibles; dark chestnut in color except midway between margin and mandibles where they are blackish. A large, oval space, light in color, before the mandibles, with a small crescent shaped signature near the center. Eye large, slightly protruding, with a small hair at its posterior margin; a rounded ocular blotch in front of the eye; also a similar one behind the eye formed by the termination of the broad marginal band of the temple; a prominent pustulated hair on the dorsal surface near the anterior ocular blotch. Temples highly divergent with margin straight, bearing two short hairs; posterior angle acute, with one very long hair and a small one; the broad temples are characteristic to this group of *Goniodes*. Posterior margin long and sinuous with central concavity very deep; margin on either side of the central concavity broadly rounded with two long hairs reaching well back on the metathorax; occipital bands prominent, dark in color with black occipital blotches; bands divergent, extending forward and fading out opposite the posterior projections of the mandibles; a prominent postulated hair on the dorsal surface, close to the inner edge of each occipital blotch.

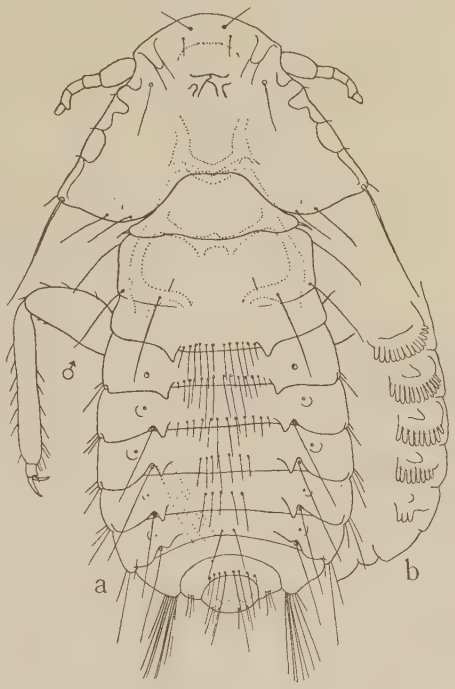

Fig. 3. *Goniodes pennaticeps* Paine and Mann.

[1] Carriker, M. A. Mallophaga from birds of Costa Rica, Central America. Univ. Studies, Univ. of Neb., Vol. III, No. 2 p. 35. (April, 1903).

Thorax shorter than head. Prothorax trapezoidal, with divergent sides and blackish submarginal bands; these bands turn inward and downward before they reach the prominent, acutely projecting posterior lateral angles, forming the first intercoxal bands; a short, heavy spine on these posterior lateral angles and another smaller one a short distance above on the lateral margin; posterior margin slightly sinuous.

Metathorax wider than prothorax, quadrilateral, with rounded angles; two long, prominent, submarginal hairs a little below the anterior angles, and another in each posterior angle. Dark chestnut to blackish submarginal bands, connecting with those of the prothorax and turning in along the posterior margin of the metathorax to form the second intercoxal bands. Posterior margin straight for about one-third its length on each side, at which point, where a long, pustulated hair arises, it becomes faint, turning downward at an angle of about thirty degrees and fading out completely before it reaches the meson. There are two small, pustulated hairs on the dorsal surface above, and a little inward from those on the posterior margin. Posterior legs with peculiarly long, straight tibiæ bearing numerous spines; the mesothoracic legs have been broken off; the anterior ones are short, being carried concealed under the broad temples.

Abdomen considerably narrower than the head, obovate, with sides straight and slightly divergent until the widest point is reached at the fourth segment, whereupon they round off gradually to the eighth; eighth segment short, not reaching as far posteriorly as the seventh or ninth; ninth segment rounded and protruding. Prominent, bipartite, lamelliform plates or appendages on the dorsal surface of each segment from the first to the sixth, extending inward from the lateral margin; inner portion a narrow, pointed appendage, separated from the lateral, linear portion by a deep sinus, embracing a long pustulated hair; in Taschenberg's[1] figure of *G. aliceps* Nitzsch, these plates are lacking on segment one; this, however, may be due to a mistake by the artist. Corresponding to these plates, in position, on the ventral surface of segments two to six are the characteristic series of dark colored, blunt, comb-like spines (Fig. 3b); the number of spines on each segment agrees with *G. laticeps* Piaget, diminishing from fifteen on each side of the second segment to three on each side of the sixth; the number, however, as noted by Taschenberg, is slightly variable; broad, darkish, lateral bands cover the region of the combs and lateral section of the dorsal plates. In length segment one is the shortest, with slightly diverging sides, not appearing as a part of the thorax as in the case of *G. laticeps* Piaget; segment two the longest, the following segments diminishing in length to the fifth, and then increasing slightly to the seventh; a series of pustulated hairs across the middle of each segment, stopping before the lateral appendages are reached; also hairs in the posterior lateral angles of each segment, and segment seven bearing a group of about ten very long ones on the ventral surface. Genitalia similar to *G. aliceps*, being composed for the most part of two long, narrow, chitinous rods.

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[1] Taschenberg, O. Die Mallophagen. Nov. Act. Kais. Leop. Carol.-Deutschen Akad. Naturforsch. Bd. XLIV, Nr. 1. Tab. 1, fig. 5. (1882).

Measurements.

Length: ♂, 2.34		Width
Head	.76	1.24
Prothorax	.30	.70
Metathorax	.33	.80
Abdomen	1.24	1.04

It is indeed strange to find *Goniodes* as a parasite of *Anthus*, a member of the family *Motacillidæ*, the Wagtails and Pipits, when it properly belongs with the *Gallinæ* and the *Phasiani* and such fowl-like birds. *G. aliceps* Nitzsch was taken from *Crypturus macrurus* and *C. tao*, and *G. laticeps* Piaget, from *Tinamus julius* and *T. robustus*. These facts cause one to be somewhat skeptical as to the validity of the present record.

Menopon exsanguis sp. nov. (Fig. 4.)

Six specimens, including two males, from a woodpecker, *Campophilis melanoleucus* Gm. (Rio Nhamunda, Brazil. Jan. 1912). Two species of *Menopon* have previously been described from woodpeckers, *M. pici* Denny[1] from *Picus viridis* (Great Britain), and *M. praecursor* Kellogg[2] from *Melanerpes uropygialis* (Baja California). The present species quite closely resembles *M. pici* Denny, as described by Piaget,[3] but differs in a number of characters, being much smaller in size, with palpi projecting by but one segment or less. Also, in *M. exsanguis*, the eye is very large and somewhat irregular, extending from the inner termination of the ocular emargination, back on the dorsal surface of the temple half way to the posterior margin and not reaching the lateral margin of the head at any point. General color pale, with darker, indefinite markings on the head and thorax.

Description of female: Head much broader than long, with front flatly rounded or slightly angled, outline of head appearing triangular. A short hair on each side, on the clypeus, a short distance from the center; another, of about the same size, at the point where the palpi pass the margin and two more very minute ones between the two above mentioned; three long hairs at short, regular intervals, before the ocular emarginations; also a long hair on the dorsal surface, on each side, on a line between the ocular emarginations and the mandibles. Emarginations narrow, not deep, with a fringe of about ten short hairs. Eyes as described above, with a

[1] Denny, Monograph, Anoplur. Brit. p. 219, pl. XX, fig. 5. 1842.

[2] Kellogg, V. L. New Mallophaga III. Occ. Papers California Acad. Sci. VI. p. 46, pl. IV, fig. 8. 1899.

[3] Piaget, E. Les Pédiculines, Supplément, p. 93, p. X, fig. 3. 1885.

large, black ocular fleck. Ocular blotches present, but pale and indefinite. Temples protruding, narrowly but regularly rounded, with six long hairs, one of which arises submarginally; also several short ones. Occiput broadly concave, with six long, submarginal hairs; Margin thickened, but little colored. Entire head rather pale yellow, with the exception of the mandibles, an area surrounding them, and the indefinite ocular blotches. Antennæ differing from those in *M. pici* Denny, the third segment being larger and goblet-shaped, receiving the last. (Fig. 4b).

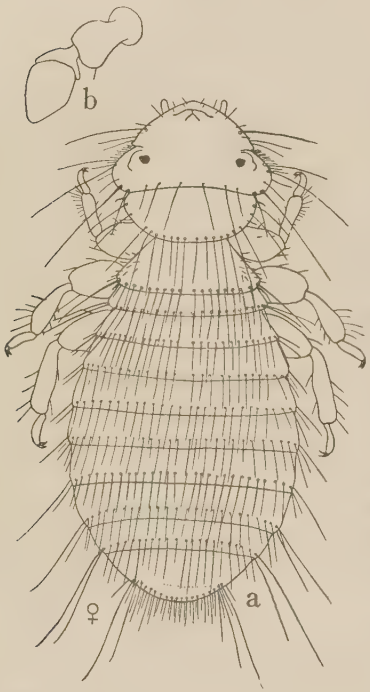


Fig. 4. *Menopon exsanguis* Paine and Mann.

Thorax slightly longer and narrower than head, with more, darker coloring. Prothorax with rounded sides merging into the flattened, almost straight, posterior margin; anterior angles rounded. A series of eighteen long hairs, with several short ones, extends around the sides and posterior margin. Lateral bands present, their inner margin indefinite. Metathorax about the same length as the prothorax, but wider, trapezoidal, with indefinite posterior margin. A number of short marginal and submarginal spines on the divergant sides, toward the acute posterior angles; two long hairs on this angle and a transverse series of about fourteen long hairs indicating the position of the posterior margin. Legs rather short, with broad, stout femora.

Abdomen elliptical, truncate where it joins broadly with the thorax, widest at the fifth segment; pale in color, with almost transparent margins. Segments of nearly equal length, with a transverse row of from twenty to thirty strong hairs. Last segment rounded, but somewhat triangular in shape, with about twenty hairs around the margin, the anterior ones of which are quite long; on the ventral surface are two fringes of fine hairs.

Male varying in size, the largest one being but little smaller than the female. Last segment similar in shape to that of the female, but with fewer hairs and lacking the ventral fringes. Genitalia prominent, consisting of a broad anterior portion and long, slender lateral appendages.

Measurements.

♀, Length: 2.50		Width:	♂, Length: 2.36.	Width:
Head	.46	.84	.46	.82
Prothorax	.32	.65	.30	.64
Metathorax	.24	.76	.24	.73
Abdomen	1.60	1.14	1.42	1.12

Physostomum sucinaceum Kellogg.

Two specimens, one immature, from *Elænia flavogaster* Thunb. (Marajo, Brazil, Nov. 1911).

Trochilœcetes gen. nov.

In general habit resembling *Physostomum*, except that the sides of the head are deeply emarginate. These lateral emarginations give the head a constricted appearance, the anterior portion forming the somewhat rectangular clypeus and the posterior portion comprising the temples and occiput; temples not produced backward; palettes present. Prothorax more rounded than in *Physostomum*, with the posterior margin convex. Metathorax showing no sign of a mesothoracic suture, broad, appearing as the first abdominal segment. Abdomen elliptical, with two pale, submarginal bands, as in *Physostomum;* last segment rounded. The members of this genus are peculiar to humming-birds, the three known species, which are closely related, having been taken from these hosts. The type of the genus is *Physostomum prominens* Kellogg and Chapman.

Included Species.

Trochilœcetes prominens Kellogg and Chapman.

Physostomum prominens Kellogg and Chapman, New Mallophaga. III. Occ. Papers California Acad. Sci. VI. p. 137. (1899).

From *Calypte costæ*, Costa's Humming-bird (Ontario, California).

Trochilœcetes doratophorum Carriker.

Physostomum doratophorum Carriker, Univ. Studies, Nebraska, Vol. III., No. 2, p. 43. (1903).

From *Selasphorus flammula* (Volcano Irazu, Costa Rica).

Trochilœcetes emeliæ sp. nov. (Fig. 5).

A single female specimen from *Thalurania furcatoides* Gould (Obidos, Brazil, Feb. 1912). This species closely resembles *T. doratophorum* Carriker, but is much smaller in size, measuring 2.10 mm. long and .86 mm. wide, while the latter species measures 2.41 mm. in length by 1.10 mm. in width. The present species also differs in the shape of the head, having larger temples.

Description of female: Head slightly broader than long, being greatest in width across the temples; front broad, shovel shaped, with clypeus but little concave; pale in color across the anterior margin; anterior angles rounded, and sides of front slightly convex with narrow marginal band a little darker than general color of front, which is pale; also a narrow darker band across the front, a little back from the clypeal margin, with a pair of backward converging projections, one on each side of the meson. Two extremely minute hairs on the margin of the clypeus; two longer ones on the dorsal surface in the anterior lateral angles and two more on the margin at this point, also several on the ventral surface; another short hair on the lateral frontal margin, a little behind those mentioned and two more on the angle just before the deep lateral emargination; a chitinous band, but little darker than the ground color of the insect, extends around the emarginations. A small well-defined triangular projection, directed outward and backward, on the margin at the beginning of the temples, and in front of this a small hair; temples rather prominent with the anterior angle weaker than the posterior, the latter bearing two rather long hairs and several short spines. Occiput sinuous, bare, with a marginal band. The palettes, in the specimen in hand, have been partially torn away or are quite small though we are inclined to believe that the former is true; the portion present rather darkly colored. Palpi small, not projecting beyond the sides of the head.

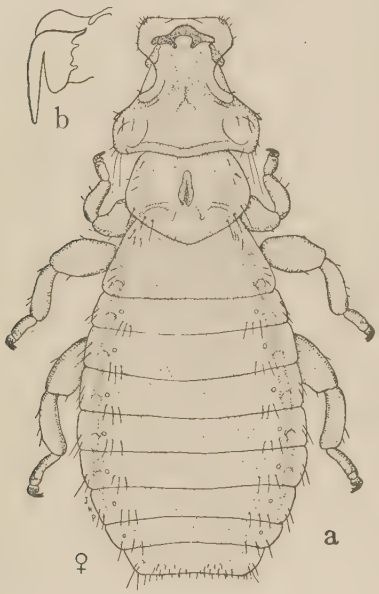


Fig. 5. *Trichilæcetes emeliæ* Paine and Mann

Prothorax subpentagonal, rounded; posterior margin strongly convex, with a rounded median angle, three strong hairs and one spine toward the lateral angles; above these angles, one marginal and three submarginal spines; a light colored submarginal band, continuous with that of the abdomen. Metathorax appearing as the first abdominal segment, with submarginal bands, continuous with those of the abdomen and prothorax and giving off a short branch, running inward along the posterior margin of the prothorax, stopping short of the meson. The metathorax extends under the prothorax for a considerable distance and gives rise to a median, chitinous, spear-shaped thickening which shows plainly through the prothorax. There are several submarginal spines, both in the anterior and posterior lateral angles; posterior margin straight. Legs stout, light in color, with narrow, marginal bands and curious, heavy, staple shaped claws. (Fig. 5b).

Abdomen, including metathorax, elliptical, narrower than in *T. doratophorum* Carriker, with the submarginal bands nearer the margins, the bands disappearing

in the sixth segment; faint, transverse bands, leaving the sutures indefinitely lighter. There are no median hairs, but several long ones on each side near the submarginal bands; last segment entire, truncate or very slightly concave, with sides rounded; a row of short hairs across the posterior margin of the last segment, and a group of strong, close-set hairs on each side on the ventral surface.

Measurements.

Length: ♀, 2.10		Width:
Head	.52	.56
Prothorax	.32	.42
Metathorax	.32	.64
Abdomen	1.06	.84

Named in honor of the collector, Dr. Emelia Snethlage of the Museu Goeldi at Pará.

A NEW GENUS AND THREE NEW SPECIES OF PHORIDÆ FROM NORTH AMERICA, WITH NOTES ON TWO RECENTLY ERECTED GENERA (*CREPIDOPACHYS* AND *PRONOMIOPHORA* ENDERLEIN).

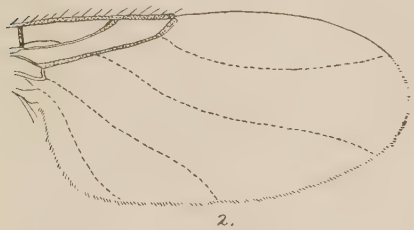
By J. R. Malloch,

Bureau of Entomology, U. S. Department of Agriculture.

Dr. G. Enderlein in describing (Stettiner entom. Zeit., 1912, p. 16) some Phoridæ from southern Brazil erected the genus *Crepidopachys* with the new species *longirostrata* as type. The legend to the figure on same page, which is presumably that of the wing of this species, indicates that it is *C. costalis*, Enderlein. Thus *costalis* is evidently a synonym of *longirostrata* Enderlein. In his remarks on the affinities of the genus he indicates that it differs from *Pronomiophora*, Enderlein, 1912, in having the costa thickened. This latter genus is not described prior to the former but at page 46 of the same publication, and therefore ought to be considered as erected on page 16, and on page 46 appear as *Pronomiophora* Enderlein and not "nov. gen." Independent of these trifling errors however I fear that there are some others which are of much more consequence. From the description I am forced to the conclusion that in erecting *Crepidopachys* and *Pronomiophora* Enderlein added two quite unnecessary genera inasmuch as both

are quite evidently synonyms of *Dohrniphora* Dahl. The swollen costa of *Crepidopachys* is I am quite confident a female character just as it is in *Phora thoracica* Meigen and in several species in *Aphiochæta* (*costalis* v. Roser, *epeirœ* Brues, etc.), and though the sex of the type is not given by Enderlein I am, I believe, correct in accepting it as a female. In the male the costa will probably prove to be normal or at least only slightly swollen. The bristling of the legs is indicated only as "Mittelschiene wie bei *Phora* mit einer Machrochæta nahe der Basis der Aussenseite." No further indication is given as to their bristling and this is given only in his remarks on affinities, not in the description. I consider the genus as synonymous with *Dohrniphora* Dahl.

Pronomiophora I consider also as a synonym of *Dohrniphora*. It agrees in every respect with the description of that genus and like nearly all the females in the genus the one here described, *rostrata* Enderlein, has the long proboscis, one of the principal characteristics of the genus. I cannot conceive how this position has been created except through an inadequate knowledge of the group and the literature on it. If we carry out this system of erecting genera for species which possess only such trifling deviations from the types of existing genera as these two, the ultimate outcome will be that we will have every species in a different genus.



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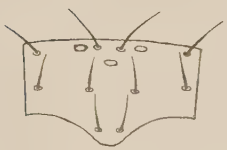


1.

Fig. 1. *Hypocerina barberi*, gen. et sp. nov. 1, front; 2, wing.

Hypocerina gen. nov.

Head of moderate size, frons (fig. 1) broad and short with 2 rows of four bristles, one vertical and one preocellar, only one pair of postantennal reclinate bristles present; anterior margin of frons produced in center, laterally excised; ocelli distinct, third antennal joint oval, slightly pointed, arista apical, basal joints elongate; epistome produced, palpi of moderate size, proboscis fleshy. Thorax and abdomen as in *Aphiochæta*. Wings with neuration as in *Puliciphora*, the second thick vein unforked and the me diastinal vein present; four distinct thin veins (fig. 2). Legs with isolated spines.

Type of genus: *Hypocerina barberi*, sp. nov.

Hypocerina barberi sp. nov.

Female: Black, subshining. Lower row of frontal bristles straight, post-antennal pair divergent. Antennæ brownish, third joint with very short whitish pilosity, arista pale, only very indistinctly pubescent on third section; palpi brown, moderately bristled. Mesonotum with short hairs and two wide placed dorso-central posterior bristles on disk, scutellum with two bristles. Abdomen opaque black, first segment very short, second dilated posteriorly, two and one-half times as long as first and with a few lateral posterior bristles, third and succeeding segments each about two-thirds as long as second. Legs brown, tibiæ and tarsi paler, fore tibiæ with one antero-dorsal bristle at basal third, mid tibiæ with one antero-dorsal and one postero-dorsal bristle at basal third and one dorsal at apical fourth, hind tibiæ with one antero-dorsal and one postero-dorsal bristle at basal third one almost dorsal bristle at below middle and a very short bristle at near apex on antero-dorsal surface, mid and hind tibial spurs long, hind pair with a shorter spur on anterior side, hind tarsus twice as long as tibia. Wings clear, costa short of middle, first division almost twice as long as second, costal fringe very short. Halteres black. Length 1.5 mm.

Type: Cat. No. 15323 U. S. National Museum.

Locality: Dead Run, Fairfax County, Virginia Oct. 26, 1912. (Barber and Schwarz). Four females, taken from a bottle which had been sunk in the ground and baited with cheese as a beetle trap.

This species bears a resemblance to the males of *Puliciphora* Dahl, but the spinose tibiæ separate it at once from that genus as does also the presence of wings and halteres in the female. It also resembles the smaller species in the genus *Hypocera* from which it is separated by the presence of only two instead of three rows of frontal bristles.

Named in honor of Mr. H. S. Barber.

Aphiochæta flavipalpis sp. nov.

Male: Brown, shining; frons slightly broader than long, lower post-antennal bristles less than half the size of the upper pair, outer pair in first row of bristles nearly in line transversely with upper post-antennals, the inner pair a little lower than post-antennals, antennæ small, brown, arista longer than breadth of frons, slightly pubescent; palpi yellow, large and projecting, a very few weak bristles present; pleuræ brown, yellow on lower portions, mesopleura with a number of equal sized bristles, scutellum with four equal sized bristles; abdomen subopaque brown, segments narrowly pale bordered posteriorly, a few short, scattered hairs on all segments, those on apical segment most distinct, hypopygium large, projecting, gray dusted, ventral processes large, anal protuberance of good size, clear yellow; legs yellow, hind femora darkened at apices, hind tibial setulæ weak, most dis-

tinct on middle; wings grayish, costa to middle, first division as long as next two together, third one-fourth as long as second, fringe as long as fork of third vein, fourth vein leaving at beyond fork, slightly bent at base and ending slightly recurved at in front of wing tip; halteres yellow. Length 2mm.

Type; Cat. No. 15324 U. S. National Museum.

One male in National Museum, District of Columbia, Oct. 19th, 1912, (R. C. Shannon). Very similar to *projecta* Becker from which the unswollen fore tarsus separates it.

Aphiochæta subciliata sp. nov.

Male and female: Black; frons glossy, about one-third longer than broad in male, slightly less in female; lower post-antennal bristles about one-half as large as upper pair in both sexes, center pair of bristles in first row much below outer pair and slightly below upper post-antennals, nearer center of frons than outer pair which are close to eye-margins; antennæ black, third joint normal in size, arista about one-third longer than length of frons, almost bare; palpi pale yellow, of normal size, moderately black-bristled, mesonotum shining, pleuræ glossy black, mesopleuræ with numerous short bristles and one long, backwardly directed one which reaches to base of halter; scutellum with two bristles; abdomen shining black, first segment shorter than second, second to fourth slightly decreasing in length, fifth and sixth elongated; surfaces of all segments with short hairs; male anal protuberance yellow, hypopygium small, but slightly exposed; legs black, fore coxæ and femora yellow, fore tibiæ and tarsi, mid coxæ, trochanters and tarsi, and extreme bases of hind tibiæ brownish; hind femora flattened, hind tibial setulæ distinct and rather widely placed (9–10); wings narrow, slightly infuscated, especially along veins, costa slightly short of middle in male, to middle in female, first division equal to next two, third division one-third as long as second, fourth vein bent at base, running slightly upward to distinctly in front of wing tip and slightly recurved at apex; fringe short and closely placed; halteres yellow, stalk darker. Length 1–2 mm.

Type: Cat. No. 15325 U. S. National Museum.

Locality: Two males, and 11 females, Washington, District of Columbia, October, 6–29, 1912, one female, Livingston Heights, Virginia, October 29, 1912 (R. C. Shannon).

This species may be mistaken in at least the male sex for *ciliata*, Zetterstedt but the costal divisions are different, and in the female of *ciliata* the fourth abdominal segment is very much shortened, being only one-third as long as the third.

NEW NORTH AMERICAN *ELATERIDÆ* AND *SCARABÆIDÆ*.

By H. F. Wickham,

State University of Iowa, Iowa City.

Limonius venablesi sp. nov.

Finely pubescent, slightly shining. Form moderately elongate for this genus, sides subparallel for the greater part of the length. Black, with a slightly greenish tint, the tibiæ and tarsi picescent, knees testaceous, elytra testaceous, each with two black spots, the anterior of which lies slightly in front of the middle and is nearly circular in outline, while the posterior is a little postmedian in position and elliptical, these markings being about equidistant from the side margin and the suture. Head with strong frontal concavity, the margin weak and obsolete at middle, only slightly reflexed and scarcely emarginate the punctuation strong, deep, and close. Antennæ (male) rather weakly serrate, the second and third joints subequal and together about as long or a little longer than the fourth which, in turn, does not differ much in length from those succeeding. Prothorax punctured similarly to the head but more closely at the sides, where there is a tendency to confluence, width equal to about five-sixths of the length, sides (in the male) nearly parallel except at the extreme base and apex, front angles rather prominent anteriorly and deflexed, hind angles rather long, a little divergent and blunt or rounded at the tips, indistinctly unicarinate. Scutellum finely punctured. Elytra subparallel at sides to about the apical third, thence rounding to the apices which are simple. Surface with distinct moderately impressed striæ which are marked with coarse approximate punctures, the interspaces slightly convex with close, irregular, more or less confluent but rather fine punctuation. Under side of body closely and finely punctured, the prothoracic flanks more roughly than the trunk and abdomen. Length, 8.50 mm.

The type is a male, collected at Vernon, B. C., May 14, by Mr. E. P. Venables, after whom it is named. I have had it in my collection for three or four years. A female from the same source differs in having the prothorax more narrowed anteriorly and the antennæ a trifle shorter. In the type, the antennæ pass the apices of the prothoracic hind angles by the length of two joints. With the British Columbian specimens, I associate, as cotypes, three examples taken by Mr. W. M. Mann at Pullman, Wash., though two of these latter are much larger and have relatively somewhat shorter antennæ. The largest of the Pullman specimens is about 14.60 mm. long, but the smallest scarcely exceeds the measurements of the type.

If this species be assigned a place in the table of Candèze (Monographie des Elaterides, III, p. 579) it would go into the second section in which the prosternal sutures are not deeply excavated anteriorly, and by the maculate elytra and carinate prothoracic hind angles would go next to *L. stigma* Hbst. However, it is not like any of the described North American species and may be recognized at sight by its size and coloration.

Aphodius iowensis sp. nov.

Oblong, moderately elongate, more parallel and less convex than usual, rufopiceous, the sides of the head and of the prothorax paler, elytra and legs reddish-castaneous, surface strongly shining and polished. Antennæ paler, the stem a little darker than the club. Head moderately convex, the three tubercles low and broad but easily distinguishable, genæ prominent but obtuse. The portion behind the row of tubercles is sparsely and extremely minutely punctured, somewhat more closely and distinctly near the sides. Clypeus with a shallow rounded anterior emargination, sides strongly divergent posteriorly, angles broadly rounded, margin narrowly reflexed, surface with fine but well separated and rather sparse granules which fade out in the neighborhood of the frontal suture. Prothorax about one and a half times as broad as long, very little narrowed anteriorly, the sides scarcely arcuate but broadly explanate, all the angles obtuse and rounded, basal marginal line showing faintly on each side of the middle; disk strongly shining, quite impunctate at middle, sides irregularly marked with deep punctures, sparse and large on the submedian area but becoming smaller and more crowded near the margin and cribrate in the impression anterior to the hind angles. Elytra at base a little narrower than the prothorax, only slightly broader behind, humeri obtuse, surface strongly shining, finely and sharply striate, striæ with regular, round, rather close, sharp punctures, interspaces flat and smooth. Body beneath with a fine alutaceous sculpture and punctate as well, the punctures distinct but rather distant over most of the ventral surface, becoming smaller and closer on the sternal side pieces. Mesosternum bluntly carinate between the coxæ. Anterior tibiæ very strongly tridentate and distinctly crenulate above the upper tooth, the spur stout and curved, first tarsal joint shorter than the second. Middle tibiæ with the spurs dissimilar, the major spur being slender and sharp, about twice as long as the minor, this latter slightly bent and chisel-shaped at tip. Hind tibiæ fimbriate at apex with unequal spinules, first tarsal joint shorter than the next three. All of the femora are sparsely punctate and hairy. Length 7.25 mm.

Collected at Lake Okoboji, Iowa, by Mr. A. O. Thomas, who has kindly given me the specimen.

This is a true *Aphodius* with short scutellum, and belongs in Horn's group I-a. From those described, it may be known by the tuberculate front, feebly emarginate clypeus, impunctate elytral intervals and punctate hind femora, this combination of characters

not occurring in any other North American species in that division of the genus. It is of special interest on account of its relation to this small assemblage of rare forms with explanate pronotal sides.

Aphodius columbiensis sp. nov.

Form rather stout, strongly convex, broader posteriorly, blackish-piceous, opaque, legs reddish-piceous, antennæ testaceous, club sooty. Head without tubercles, finely and sharply but not closely punctured, clypeus emarginate at middle, angles distinct but rounded, sides diverging regularly with scarcely any arcuation to the rounded, moderately prominent genæ, margin feebly reflexed, clypeal punctuation fine and rather sparse. Prothorax with the sides parallel posteriorly, arcuate for a short distance anteriorly, all the angles rounded, surface alutaceous and having besides a double system of punctuation, the larger punctures fairly evenly disposed (but allowing some smoother areas in the discal region and an impunctate median line) and ordinarily separated by approximately their own diameters, the fine punctures irregularly scattered among the others. Basal marginal line distinct. Elytra at base a little narrower than the prothorax, becoming broader behind the middle, humeri dentiform, disk very regularly but finely striate, the striæ with well-marked distant punctures giving a catenate appearance to the grooves, interspaces flat, strongly alutaceous and opaque but impunctate. Body beneath rather coarsely and sparsely punctate on the meso and metasternal side-pieces, the mesosternum not carinate, abdominal punctuation indistinct, replaced by a longitudinal rugosity of the segments. Posterior and middle femora strongly but not densely punctate. Length, 5.25 mm.

Collected at Vernon, B. C., by Mr. E. P. Venables, who gave me the type specimen.

This also is a genuine *Aphodius*, belonging to Horn's group *H*, in which it approaches *A. opacus* Lec., but is at once distinguishable by the elytral striæ being distinctly punctured. The fore tibiæ are strongly tridentate, crenulate above the upper tooth, the edges fimbriate with yellow hairs. Both spurs of the middle tibiæ are sharply pointed at their apices and of normal form, differing only in size, those of the hind tibiæ are very long, slender and sharp. The basal joint of the hind tarsus is about as long as the next three. The alutaceous sculpture appears to extend to all parts of the body, even showing on the legs.

Anomala camancha sp. nov.

Size large. Surface subopaque. Form subparallel, recalling *Cyclocephala*. Color yellowish testaceous, head, tibiæ, and tarsi darker, reflexed edge of clypeus, prothoracic marginal bead, outer edging of fore tibiæ, and most of the spines and ridges on the middle and hind pairs piceous or blackish in somewhat varying degree,

eyes black. Head of normal size, front rather coarsely, densely, and more or less confluently but not deeply punctured, the vertex much less closely. Clypeus punctured similarly to the front but a little less strongly, the front edge nearly straight, angles broadly and evenly rounded, sides subparallel or slightly convergent posteriorly for about the basal half of the length, margin entire, somewhat strongly reflexed, frontal suture deeply impressed and about straight, Antennal club about equal in length to all of the remaining joints. Pronotum with an antemedian, shallow, dark-colored fovea each side, marginal bead strong all the way around, basal lobe barely visibly emarginate or sinuate at middle, the pronotal disk punctured, rather sparsely over most of the surface but more closely at sides, the punctuation fine, the intervening spaces alutaceous. Scutellum punctured similarly to the pronotum. Elytra a little more shining than the prothorax, distinctly and rather strongly striate, the striæ punctured weakly on the disk, a little more strongly at the sides and near the base, the intervals of the dorsum distinctly alternating in height and breadth, the broader ones lower than the others and rather sharply punctured. The interval just external to the sutural stria is the widest and has the punctures arranged in a rather confused double series, while on the other two flat discal intervals the series is single. The intervals external to these are not punctured, except with the fine alutaceous marking that gives the appearance of subopacity to the elytra. Propygidium punctured, with a distinct tendency to transverse rugosity, pygidial sculpture finer and more rugose. Body beneath strongly hairy on the thoracic sternites but less so on the abdomen and femora, metasternum distinctly and closely but not very deeply punctured, abdominal segments strongly shining and sparsely punctate. Legs of moderate thickness, the posterior tibiæ not dilated, the front pair bidentate, none of the claws cleft at tip, but those of the anterior tarsus are somewhat dissimilar, the inner one being a little twisted, suddenly bent near the base and with a marked thickening just external to this bend. The two claws of the middle tarsus are about alike, except that the inner is a trifle more slender, those of the hind tarsus are similar to the middle ones. Length, 13.50 to 16.50 mm.

Described from six specimens kindly given me by Mrs. Lucy Brant Meade, who collected them Aug. 9, on Capitan Mt., New Mexico.

By the non-protuberant mesosternum and nearly simple (not cleft) claws, this should go into the sub-genus *Rhombonyx* and belongs near *A. cavifrons* Lec. and *A. carinifrons* Bates, differing from both in the impressed (instead of carinate) frontal suture. It is also larger than either of the two species noted and differs from both in several minor characters which may be gathered from the description.

Anomala apacheana sp. nov.

Similar in form, size, color and luster to *A. camancha*, but is somewhat more shining and differs in the following particulars. Clypeus narrower and longer in

proportion, much more broadly rounded so that the arcuation of the angles involves the front border to the extent of loss of the straightness of the anterior margin. The clypeal disk is much less strongly punctured and the concavity is more pronounced. Frontal suture strongly carinate, front and vertex less punctured than in *A. camancha*. Prothorax with the sides a little divergent, the posterior angles slightly everted, while in *A. camancha* the sides converge a little posteriorly and the angles are not everted. Pronotal discal punctuation finer, and more scattered. Elytral strial punctuation a little more pronounced than in *A. camancha*, but that of the intervals much less so, the broadest interspace, next to the sutural stria, having a rather irregular single series only. Pygidium finely and very sparsely punctate. Claw structure almost identical with the preceding species. Length 12.25 mm.

Described from a single specimen, collected by myself, July 9, at El Paso, Texas.

This, too, is a *Rhombonyx*, differing at once from *A. camancha* in the cariniform frontal suture, agreeing in this character with *A. carinifrons* Bates and *A. cavifrons* Lec. From the former, it may be told by the thoracic punctuation ("sat dense et fortius" in *A. carinifrons*), the single punctate series on the subsutural interval and the distinct though not very strong dilatation of the major anterior tarsal claw. From *cavifrons*, it separates by the larger size, the punctate elytral intervals and the shape of the prothorax.

A GIANT COCCID FROM GUATEMALA.

By William Morton Wheeler,

Bussey Institution, Harvard University.

The Coccidæ are usually described in our entomological textbooks as "small" or "minute" insects, and this is certainly true of the species of temperate regions. In the tropics, however, where the family is most abundantly represented, there are several large forms which make their congeners look like pygmies. For example, the adult female of *Hemilecanium theobromæ* Newstead, one of the species found on cacao in Cameroon, West Africa, is 13–15 mm. long and 12–13 mm. wide.[1]

[1] Newstead, On a Collection of Coccidæ and Other Insects Affecting Some Cultivated and Wild Plants in Java and in Tropical Western Africa. Journ. Econ. Biol. III, No. 2, 1908, pp. 33–42, 2 pls.

Newstead has also recently described and figured an even larger species, *Aspidioproctus maximus*, the old adult female of which measures 33 mm. in length, 25 mm. in width and 15 mm. in height.[1]

This occurs in German East Africa, Rhodesia and Cape Colony, chiefly on the M'sasa tree (*Bradjustagia randii* Buteers). Another species of the same genus from German East Africa (*A. armatus* Newstead) is considerably smaller, measuring 12–17 mm. in length, but is nevertheless a very large Coccid.

On December, 1911, at San Lucas Toliman, on the shore of Lake Atitlan, Guatemala (alt. 5000 ft.), I found a large Coccid on the branches of one of the *Erythrina* trees (presumably *corallodendron*, the "arbol madre" of the Mexicans) very commonly used to support the barbed wires around the plantations and gardens. The tree, which bore no leaves owing to the lateness of the season, looked from a little distance as if it were covered with galls as large as cherries, but the columns of fire ants (*Solenopsis geminata*), attending these objects, soon opened my eyes to the fact that they were Coccids and not vegetable excrescences.

Some of the specimens were sent to Prof. Cockerell who pronounced them to be, in all probability, Signoret's *Lecanium sallei*, since assigned to the genus *Neolecanium* Parrott by Prof. Cockerell.[2] I find on looking up Signoret's description[3] that it agrees very well with my specimens, though it is very brief and apparently drawn from a single specimen. This was received from Sallé, who collected it somewhere in Mexico, but without indicating the host-plant.

My specimens are all adult or nearly adult females and measure 11–20 mm. in length, 10–15 mm. in width and 9–14 mm. in height. As they have contracted since they were collected, the dimensions of the living insect are probably 2–4 mm. greater. The largest individuals have the elliptical body evenly smooth and convex above, but the smaller ones, though very convex in the mid-dorsal region, have the sides depressed and more or less distinctly transversely ridged. The ventral surface is flat or concave and under

[1] On a Collection of Coccidæ and Aleurodidæ, chiefly African, in the Collection of the Berlin Zoölogical Museum. Mitth. Zoöl. Mus. Berlin V, 2. Heft, 1911, pp. 155–174, 12 text figs.

[2] A Contribution to the Knowledge of the Coccidæ. Ann. Mag. Nat. Hist. (7) IX, 1902, pp. 450–454).

[3] Essai sur les Cochinelles ou Gallinsectes (Homoptères-Coccides) IIe Partie. Ann. Soc. Ent. France (5) III, 1873, pp. 395–448).

a lens minutely wrinkled. The color of the dorsum is dull Naples or pale brownish yellow in the palest individuals. Under a lens magnifying 20 diameters the surface is slightly roughened and covered with minute brown dots, which in some specimens fuse to form irregular brown or black blotches. In many specimens these blotches have in turn fused till the whole mid-dorsal region

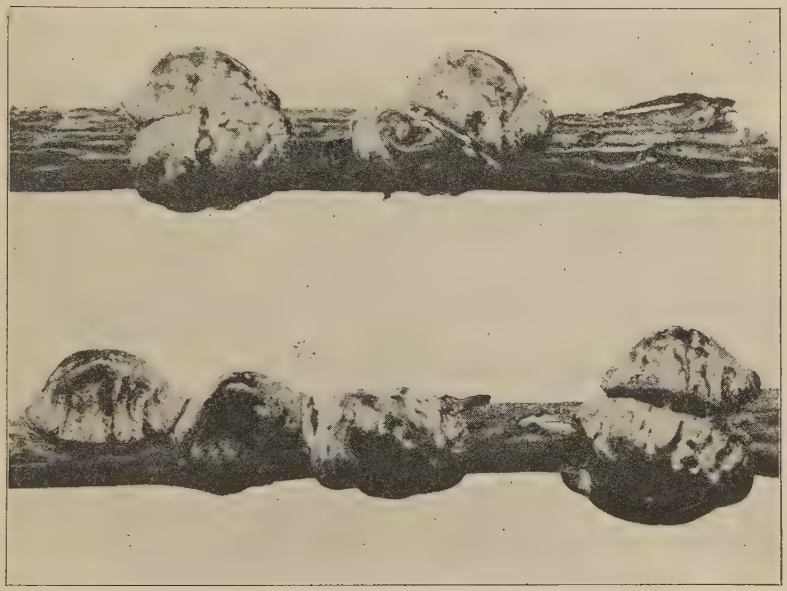


Fig. 1. *Neolecanium sallei* Signoret, natural size.

is dark-colored. The accompanying photographs give a good idea of the form of this Coccid and of the way it clings to the *Erythrina* twigs.

Neolecanium sallei does not seem to be a common species. Though I had occasion to examine a great number of *Erythrina* trees in various localities in Costa Rica and Guatemala, the single tree at San Lucas Toliman was the only one on which it was found.

SPECIES OF THE GENUS *GAURAX* OF THE EASTERN UNITED STATES.

By Charles W. Johnson,

Boston Society of Natural History.

These interesting little flies are only occasionally taken in sweeping but can often be obtained in some numbers in breeding other insects, as they differ from other members of the family Oscinidæ, in feeding upon insect remains instead of vegetable matter. They are not parasitic but inquilinous or more properly speaking scavengers, the larvæ feeding upon the cast-off skins of caterpillars, pupæ cases and spider eggs.

Gaurax anchora Loew has been bred from the cocoons, etc., of *Samia cecropia*, *Hemerocampa leucostigma* (Tussock moth); *Porthetria dispar* (Gypsy moth), and egg cluster of *Corydalis cornutus*. *Gaurax araneæ* Coq., of California was reared from the egg-sac of a spider (*Argiope riparia*), and *Gaurax lancifer* Coq. of the West Indies, also from egg-sacs of spiders. The habits of the other species are unknown. The *Gaurax ephippium* Zett., referred doubtfully to this genus by Coquillett in the list of Diptera of Beulah, New Mexico, (Trans. Amer. Ent. Soc., XXIX, 106, 1903) is a Chlorops according to European authors.

In studying the New England species collected during the past few years, I find one new species, making four from this region. They may be tabulated as follows:—

1 Thorax yellow, with a black dorsal mark.....2
Thorax entirely black; scutellum yellow.....*montanus* Coq.
2 Wings entirely hyaline.....3
Wings with the basal half smoky black.....*obscuripennis* sp. n.
3 Thorax with a narrow anchor-shaped mark; scutellum also marked with black.....*anchora* Loew
Thorax with a broad mark, the posterior edge tridentate; scutellum entirely yellow.....*festiva* Loew

Gaurax montanus Coquillett.

Aside from the type locality, White Mountains, N. H., I have collected this species at Norwich, Vt., July 8, 1908.

Gaurax obscuripennis sp. nov.

Face black, front brown, vertex yellow, ocellar triangle and occiput black; basal joints of the antennæ yellowish, third joint black, aristæ whitish, densely pilose. Thorax yellow, with whitish hairs and a dorsal line, broad in front and becoming gradually narrower posteriorly, humerus, a small spot in front of the wing, and a large spot on the center of the pleura, black, the metanotum yellow, with a black spool-shaped mark. Abdomen black. Halteres black, stems light yellow. Legs light yellow, the apical third of the posterior femora black. Wings smoky, the basal half forward of the fifth longitudinal vein blackish. Length, 1.5 mm.

One specimen, Chester, Mass., August 7, 1912. Type in the collection of the Boston Society of Natural History.

Gaurax anchora Loew.

Elachiptera dispar Williston, in Furbush and Fernald, Rept. on Gypsy Moth, 1896, p. 390, pl. 53, fig. 12.

Collected by the writer at Weston, Mass., July 23, 1911.

Gaurax festivus Loen.

Beverly, Mass., July 20, [Burgess] (U. S. Nat. Mus.); Auburndale, Mass., June 12; Pottstown, Pa., August 8, (C. W. Johnson).

In addition to the above the following species was discovered among some unidentified material.

Gaurax pseudostigma sp. nov.

♀ Face, front and antennæ yellow, ocelli and occiput black. Thorax and scutellum yellow, with whitish hairs, metathorax shining, yellow, with a narrow band of black below the scutellum. Abdomen yellow, with broad bands of black on the posterior portion of the segments, the first narrowly interrupted. Halteres and legs light yellow. Wings hyaline, with a black stigma-like spot at the end of the marginal cells. Length, 1.5 mm.

One specimen, Toronto, Ontario, Canada, July 4, 1911 (M. C. Van Duzee).

POSITIVE THIGMOTROPISM OF *CULEX PIPIENS* IN HIBERNATION.

By Harry B. Weiss,

New Brunswick, N. J.

Commencing about the middle of September, gravid females of *Culex pipiens* become strongly negatively phototropic and seek dark hibernation quarters which in the cities consist of cellars, basements, closed empty houses and the like. They must however be dark. The activity of these hibernating individuals depends entirely upon the temperature of the cellar or other place selected. If the place be warm, they are quite active when disturbed and if cold they are more or less torpid. Positive thigmotropism is of course exhibited only by those hibernating in warm places.

After having become acclimated to these surroundings, the negative phototropism seems to be entirely supplanted by positive thigmotropism. Phototropic stimuli no longer produce responses. Upon being disturbed, they fly readily, but not far from their place of rest which is usually the lower side of a wall and always return to a similar position.

A shaft of sunlight manipulated by mirrors and thrown upon specimens in these positions produced absolutely no reactions. A sixteen candle-power electric light placed a foot away from specimens and allowed to remain there for an hour, also produced no response. The insects made no attempt to fly into a region of less illumination or from a less to a greater, but remained clinging to the wall. Of course it must be remembered that they were in a slightly dormant condition. Nevertheless they responded actively to mechanical stimuli.

In addition to being positively thigmotropic, gravid hibernating females of *Culex pipiens* are negatively geotropic. They always assume a position with the long axis of the body perpendicular to the earth and the head pointing upward. Never have I seen one in a different attitude.

The tropisms of *C. pipiens* are varied and interesting. Taking the female, we find her during the summer to be normally nega-

tively phototropic. Those produced during the end of the season become strongly negatively phototropic and after entering into a state of partial hibernation, no longer react phototropically but instead become positively thigmotropic and negatively geotropic. Upon the approach of spring they become positively phototropic up to a low intensity and normally negatively phototropic and in addition positively chemotropic to certain stimuli. Herein is included the instinctive action of hibernation dependent upon or induced by several tropic stimuli.

PECULIAR HABITS OF SMALL DIPTERA, *DESMOMETOPA LATIPES* MEIG.

While collecting bees on the flowers of the wild aster on September 15, 1912, I noticed a small fly make a dash at a spider that was resting on a milkweed leaf. Closer examination showed that the spider was feeding on a plant bug, *Lygus pratensis* L., which was wholly hidden beneath the body of the spider. There were also three of the flies on the leaf an inch or so away, and occasionally one or all of them would rush in under the forelegs of the spider and cling to the body of the victim. They did not seem to mind the constantly moving forelegs and were only disturbed when the spider moved itself and prey bodily. Possibly they had to move to escape being jammed against the leaf. I was not able to make sure that they were lapping up the juices of the bug but I have no doubt that this is the reason for their actions.

The fearlessness of these small insects, barely equal to the head of the spider, was astonishing to me and I can but wonder at the acquisition of such a habit of robbery from so formidable an enemy.

All the specimens were captured and submitted to Mr. C. W. Johnson who very kindly furnished the names of them. The spider is a female *Phidippus multiformis* Emerton, and the flies are *Desmometopa latipes* Meigen.

C. A. Frost.

AN UNDESCRIBED HYMENOPTEROUS PARASITE OF THE HOUSEFLY.[1]

By C. H. Richardson, Jr.

During the summer of 1912, Mr. J. H. Paine reared from the pupæ of *Musca domestica* Linn. at Forest Hills, Mass., a number of specimens of an apparently undescribed Pteromalid belonging to the genus *Spalangia*. These were kindly placed at the writer's disposal and formed the basis of a life-history study which, it is hoped, will be published in the near future.

The present paper deals with a preliminary description of the species which will be known as

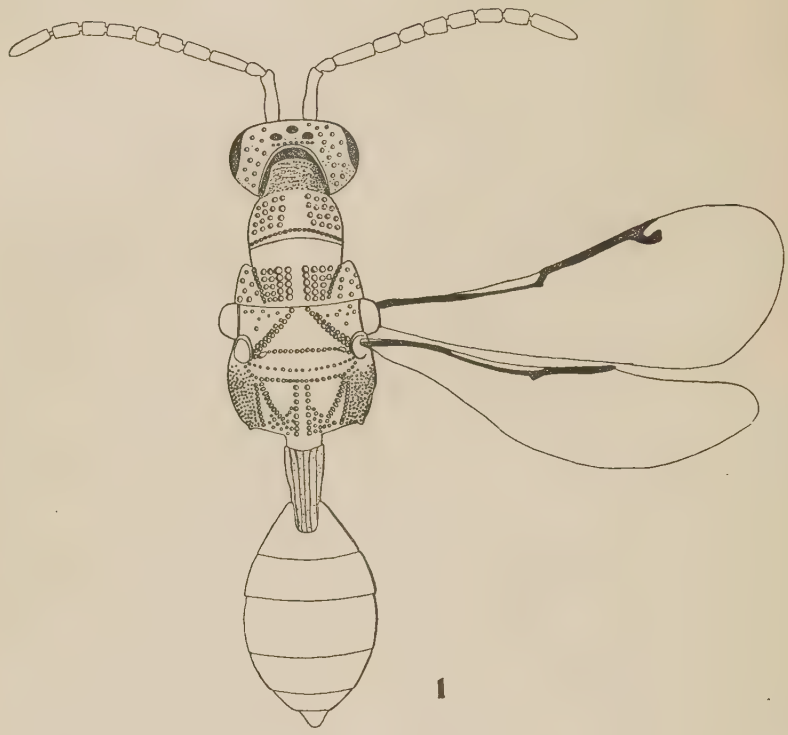
Spalangia muscidarum sp. nov.

Male: (Fig. 1) Length 3-3.5 mm. Frontal aspect of head oblong-ovate, with numerous large depressions; eyes ovate, not emarginate in front; entire head covered with a short rather stout light-colored pile; ocelli present; labrum very small in proportion to length of head, the free border rounded, hairy; mandibles bidentate, length more than twice the width at base; antennæ 10-jointed; scape as long as the three succeeding joints, covered with hair of the same texture as that on the head, second joint shortest; third joint almost as long as the succeeding two; the remaining seven joints except the last which is longer, of equal length; they are covered with fine light-colored hair; genæ punctate like the face.

Thorax above with the three divisions distinct; anterior narrowed portion of pronotum finely punctate and sharply marked off from the posterior part, which is sparsely and very coarsely punctate except for a median smooth space widest posteriorly; a transverse row of deep umbilicate punctures near its posterior margin; mesonotum smooth and polished anteriorly, sparsely punctate posteriorly and laterally leaving a smooth median space for its entire length; parapsides prominent with a few scattered punctures; parapsidal grooves deep, punctate; scutellum smooth, sometimes with several scattered punctures at sides; a distinct puntured line crosses it posteriorliy; post-scutellum smooth; metanotum with two deeply punctate longitudinal lines separated by a smooth raised area; on either of these lines of punctures is a smooth space bounded posteriorly and laterally by numerous deep punctures, smallest and most abundant on the sides. Mesopleuræ each with a single fovea; an aciculate depression below and behind the tegula. Abdomen smooth except petiole which is finely aciculate; 3rd segment largest. Hind coxæ swollen; first joint of tarsi not quite as long as the succeeding four. Wings hyaline covered with short stout hairs. Venation piceous. Color of thorax deep bronze; abdomen dëneous; the tarsi yellow-brown except the last joint which is black.

The female is larger and of a more delicate structure than the male. The head is longer and narrower (Figs. 3 & 4), the antennæ are more slender and the abdomen (Fig. 2) is of different proportions.

[1] Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 64.



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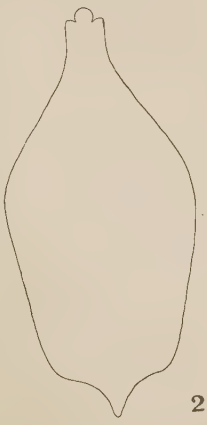

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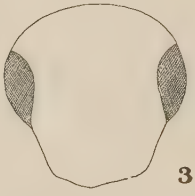

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RICHARDSON—SPALANGIA MUSCIDARUM.

Described from 1 type (male) and several paratypes of both sexes.

Spalangia muscidarum closely resembles *S. rugosicollis* Ashmead[1] from which it may be separated by the presence of a smooth median space on the posterior surface of the mesonotum and the entire absence or extreme paucity of punctures on the sides of the scutellum above the punctured line.

Eight specimens reared from *Stomoxys calcitrans* by Mr. H. Pinkus at Dallas, Texas, agree in detail with the series from Forest Hills, except that they have a more or less uniformly punctured pronotum which, in the latter, is smooth medially.

Muscæ has appeared as a manuscript name for a species of the genus *Spalangia*[2] which was taken from a puparium of the house fly by Mr. H. L. Sanford, but no description of the species has been published.

This ecto-parasite was found abundantly within the puparia of house flies, but was not known with certainty to parasitize other species. However, *Stomoxys calcitrans* Linn. whose puparium resembles closely that of *Musca domestica* was breeding quite abundantly with the latter in a region infested with *Spalangia muscidarum*, and it seems reasonable to suppose that the parasites did not discriminate between the two. The fact that the specimens from Texas obtained by Mr. Pinkus were reared from *Stomoxys* favors this view.

The writer is indebted to Dr. L. O. Howard and Mr. J. C. Crawford of the Bureau of Entomology for determination and loan of specimens, and to Mr. F. C. Bishopp for sending the Texan specimens referred to above.

EXPLANATION OF PLATE

Fig. 1. *Spalangia muscidarum* sp. nov., male.
Fig. 2. Outline of abdomen of female.
Fig. 3. Front view of head of male.
Fig. 4. Front view of head of female.

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[1] Proc. Entom. Soc. Washington, Vol. 3, p. 36. (1894).

[2] Howard, L. O., The House Fly—Disease Carrier, Frederick A. Stokes Company, New York, 1911, p. 90.

Mr. J. C. Crawford (*in lit.*) holds that this is a described species which should be attributed to Howard, since what is probably the same form is referred to by Dr. Howard (*loc. cit.*) in the following words: "... a fully formed and active adult black Spalangia crawled immediately from the opening ... This will be described by Girault as *Spalangia muscæ*." This particular specimen in question is not at present accessible; therefore we have no means of comparing it with the series under consideration.

Unfortunately the word *black*, which constitutes the entire description, will not apply strictly to this species in which the color is distinctly bronzed and a portion of each tarsus is yellow-brown as described above. Likewise if used in the cited general sense, it would apply as well to *Spalangia rugosicollis* Ashm. *S. drosophilæ* Ashm. or to *S. haematobiæ* Ashm. as to the present species; it has no diagnostic value. Moreover, since this species will soon enter ecomonic literature, it seems highly expedient to propose a name accompanied by a description by which it may be distinguished from other members of the same genus.

NEW NEOTROPICAL ANTOCHINI (*TIPULIDÆ DIPTERA*).

By Chas. P. Alexander,[1]
Ithaca, N. Y.

This paper considers only the members of the Limnobiine tribe *Antochini*, a rather extensive group in the tropics. The genera have an almost Cosmopolitan distribution, occurring in both the Old and New Worlds, exceptions existing in *Styringomyia*, *Paratropeza*, *Thaumastoptera*, *Diotrepha* and *Atarba*. The material studied herein, is, for the most part, the property of Cornell University and the U. S. National Museum and to Dr. J. Chester Bradley and Mr. Frederick Knab, I am indebted for the privilege of examining these collections.

A KEY TO THE ANTOCHINE GENERA.[1]

1. Cell R_2 present (Central and South Amer.) ..... *Paratropeza* Schiner.
   Cell R_2 absent 2
2. Rostrum prolonged, at least as long as the head 3
   Rostrum shorter than the head 6
3. Rostrum about as long as the head. (Eur.; N. and C. Am.; Austral.) *Rhamphidia* *Meigen.*
   Rostrum about as long as the body 4
   (*Toxorrhina* group)
4. Radial sector two-branched 5
   Radial sector unforked (N. and S. Am.; Africa) ..... *Toxorrhina* Loew.
5. Anterior branch of Rs (R_{2+3}) long, as long as the posterior branch (R_{4+5}) (Eur.; N. and C. Am.; East Ind.) ..... *Elephantomyia* Osten Sacken
   Anterior branch of Rs (R_{2+3}) very short, oblique, tending to disappear. (Africa, America; tropics) ..... *Ceratocheilus* Wesche
6. Cu_2 at least 4 times as long as the deflection of Cu_1; deflection of Cu_1 tending to retreat toward the wing basis ..7 (*Thaumastoptera* group)
   Cu_2 not much more than twice as long as the basal deflection of Cu_1; Cu_1 (deflection) remaining at, or near, the fork of M 9
7. M_{1+2} free at the wing-tip. (M_3 fused with Cu_1 obliterating cell M_3.) (Europe; Seychelles Is) ..... *Thaumastoptera* Mik
   M_{1+2} fused to the wing-tip 8
8. M_3 distinct from Cu at its tip forming a cell M_3; basal deflection of Cu_1 under the base of Rs. (Eur.; N. and C. Am.; Austral.) *Orimarga* Osten Sacken

[1] Contribution from the Entomological Laboratory, Cornell University.

M_3 fused with Cu to the tip, obliterating cell M_4; basal deflection of Cu_1 retreated far toward the base of the wing. (N. and S. Amer.) ..... *Diotrepha* Osten Sacken

9. R_1 very short, ending before the middle of the wing, the sector originating near its tip. (Australasia to Africa) ..... *Styringomyia* Loew.

R_1 ending beyond the middle of the length of the wing, the sector remote from the tip 10

10. Radial cross-vein present 11

Radial cross-vein absent 12

11. Rs very long, straight, but diverging from R_1; basal deflection of R_{4+5} twice as long as cross-vein *r-m*; basal deflection of Cu_1 before the fork of M; radial cross-vein usually in a direct line with *r-m*; anal angle of the wing very prominent. (Eur.; N. Amer.) *Antocha* Osten Sacken

Rs shorter, more arcuated; basal deflection of R_{4+5} about as long as *r-m*; basal deflection of Cu_1 at, or beyond, the fork of M; radial cross-vein usually slightly distad of the level of *r-m*; anal angle of the wing feeble. (N. and S. Am.; Asia; Australia) *Teucholabis* Osten Sacken

12. Rs short, not much more than twice as long as the deflection of R_{4+5}; cell R_1 broader at base than at tip (*Atarba*) or else Rs gently arcuated and the veins issuing from cell 1st M_2 twice as long as that cell (*Dicranoptycha*) 13

Rs long, and very straight, close to R_1 leaving cell R_1 extremely narrow; deflection of R_{4+5} very short, almost perpendicular to Rs at its origin; cross-vein *m* present in New World species. (Eur.; N. Amer.) ..... *Elliptera* Schiner.

13. Rs originating opposite to the end of Sc; cell 1st M_2 short, almost as broad as long. (Eastern U. S.) ..... *Atarba* Osten Sacken

Rs originating far before the end of Sc; cell 1st M_2 elongate, twice as long as broad. (Eur.; N. Am.; Africa; East Ind.) *Dicranoptycha* Osten Sacken

Ellipteroides Becker[2], erected in 1907 for the new species, *piceus*, is almost certainly *Eriopterine*. The presence of a cell R_2 is a tribal character, not generic as considered by Becker. But one genus, *Paratropeza* Schin., occurs in the Antochine series that possesses cell R_2, but this genus, in all other respects is a true member of that series. *Ellipteroides* is not, but seems, rather, to be a generalized form allied to *Gonomyia*. It is not at all related to *Elliptera* Schin., as Becker states, and this reference was probably made chiefly on the lack of cell 1st M_2 (discal), a very unimportant

[1] *Ellipteroides*, Becker is omitted; see discussion at the end of this key.

[2] Becker, T. Die Ergebnisse meiner Dipterologischen Frühjahr-reise nach Algier und Tunis 1906. (Zeitschr. für Syst. Hymenopt. und Dipterol.; vol. 7, p. 239; figure) (1907).

character in this genus. The insect, *piceus*, from Algiers, N. Africa, is blackish with yellow spots; cross-vein *r* absent; cell 1st M_2 open, the outer deflection of M_3 being obliterated; Rs rather straight, but diverging strongly from R_1, etc. *Gymnastes* Brunetti; not distinct from *Teucholabis*, the opinion of Mr. F. W. Edwards who is well acquainted with the Old World Fauna.

Teucholabis Osten Sacken

The number of species belonging to this genus now known from the American Continent is 21, of which I have seen 12.

Teucholabis venezuelensis Macq.[1] and *T. melanocephala* Fabr.[2] have not hitherto been recognized as belonging to this genus but there can be no question as to their position. Both species are described as having pale clouds on the wings, not distinct brown bands as in the *polita* group.

The *Limnobia bifasciata* Fabr.[3] is likewise a *Teucholabis* and conspecific with *trifasciata* End;[4] however the Fabrician name is preoccupied[5] and so Enderlein's name is valid.

Rhamphidia scapularis Macq.[6] is a *Teucholabis* as was indicated by Osten Sacken in 1869; still Kertesz (1902) retains it under *Rhamphidia;* the same statement applies to *Limnobia simplex* Wied[7] which is retained in *Limnobia.*

Teucholabis sackeni sp. nov.

Wings banded; thorax with a chestnut dorsal stripe; femora yellow with the tip black.

♀. Length, 4–4.5 mm; wing, 5 mm.
Fore leg, femur, 3.4 mm; tibia, 3.4 mm; tarsus, 3 mm.
Middle leg, " 3 mm; " 2.6 "
Hind leg, " 3.8 mm; " 3.1 " tarsus, 2.5 mm.

Head: rostrum, palpi and antennæ dark brown. Front, vertex and occiput rather dark brown.

Thorax: collare orange-yellow; prothorax very light yellow; mesothorax, bright yellowish-brown; præscutum with a dark brown median mark, broadest anteriorly, narrowed behind, beginning rather far behind the anterior margin of the sclerite,

[1] Macquart, Dipt. Exot.; supplément, 1, p. 19; (1846), (*Limnobia*)
[2] Fabricius, Entomol. Syst.; vol. 4, p. 241; (1794); (*Tipula*)
[3] Fabricius, Syst. Antl.; p. 31; (1805); (*Tipula*)
[4] Enderlein, Zoöl. Jahrbuch Abth. F. Syst.; vol. 32, pt. 1; p. 69, 70 (1912)
[5] Schrank, Enum. Ins. Austr.; p. 428 (1781) (*Tipula*)
[6] Macquart, Dipt. Exot.; vol. 1, pt. 1; p. 73 (1838) (*Rhamphidia*)
[7] Wiedemann, Aussereur. Zweifl. Insekt.; vol. 1; p. 549 (1828) (*Limnobia*)

running caudad; sides of the sclerite between the pseudosutural foves (humeral pits) and the transverse suture, almost filled with a large rounded dark brown spot, this mark not touching the dark median vitta (as in *melanocephala*); scutum, with the exterior front angles darkened; scutellum and post-notum very dark chestnut-brown. Pleuræ, propleuræ yellowish; mesopleuræ very dark brown, almost black. Halteres pale at base, stem brown, knob bright yellow. Legs: coxæ and trochanters bright yellow, abruptly contrasted with the dark pleural and sternal coloring; femora light yellow, the apical portions abruptly dark brownish-black, these dark tips rather broadest on the fore-femora; tibia dull yellow, the extreme tip brown, broadest again on the fore-tibia; tarsi dark brown. Wings: hyaline, stigma dark brown, square; wings broadly banded with pale greyish-brown, the innermost band extending from the origin of Rs to the end of 2nd Anal, almost diamond-shaped, the breadth sub-equal to the length; the middle fascia is a paler continuation of the stigma, across the cord of the wing and ending at 1st Anal, rather narrowest near the fork of M; the apical band is rather darker and fills out the wing tip, its inner margin straight and embracing the outer end of cell 1st M_2. Venation: (See fig. a.): Cell 1st M_2 very elongate, rather square at its inner end; veins beyond cell 1st M_2 (discal) short, so that that portion of M_{1+2} between cross-veins *r-m* and *m*, is longer than the distal segment of M_{1+2}. The type has the cell 1st M_2 open, confluent with cell M_3, due to the disappearance of the outer deflection of vein M_3.

Abdomen: tergum dark brownish-black, the apices of the segments broadly paler; 7th tergite orange-yellow; 8th blackish; valves of the ovipositor pale, orange-yellow; sternum similar, but the pale apical margin even broader, embracing the apical half of the sclerite.

Holotype, ♀, Sonsonate, Salvador, Cent. Am. (Frederick Knab, Coll.) Paratypes, ♀ ♀. Aguna, Guatemala, Cent. Am. (alt. 2000 ft.) (Dr. G. Eisen, coll.)

Type and one paratype in U. S. Nat. Mus. Coll. (No. 15,124).

One paratype in author's collection. I take pleasure in naming this handsome species after the "Father of American Dipterology," Baron C. R. von Osten Sacken.

This species falls in the *polita* group, the species of which may be separated by the following key:

1. Thoracic præscutum entirely shiny black 2
   Thoracic præscutum more or less orange-yellow or brownish 4
2. Pronotum yellowish. (Colombia) ..... *trifasciata* End[1]
   Pronotum black 3
3. Small species (♂, length, 2.5–3 mm.); legs with the basal two-thirds yellowish-tawny. (Brazil) ..... *polita* O. S.[2]
   Larger species (♀, length, 5 mm.); leg dark brown. (Costa Rica) .. *rostrata* End.[3]

[1] Enderlein, Zoölog. Jahrbuch abth. f. Syst.; vol. 32, pt. 1; p. 69, 70; fig. R_1 (1912).
[2] Osten Sacken, Berl. Ent. Zeitschr.; vol. 32, pt. 2; p. 189 (1887).
[3] Enderlein, Zoölog. Jahrbuch abth. f. Syst.; vol. 32, pt. 1; p. 68, 69; fig. Q_1 (1912).

4. Mesonotum mostly orange; a black spot on the præscutum. (Eastern Brazil) ..... *pulchella*, sp. n.
Mesonotum chestnut in the middle, black on the sides of the præscutum. (Guat.—Salvador) ..... *sackeni*, sp. n.

Teucholabis pulchella sp. nov.

Wings banded, thorax yellowish with a large black spot on the mesonotum; femora brown.

♂. Length, 8.3 mm.; wing, 7 mm.

Fore leg, femur, 3.4 mm.; tibia, 4.1 mm.; tarsus, 4.6 mm; (alcoholic) ♂.

Head: rostrum and palpi brown, the apices of the segments of the latter very narrowly paler; antennæ brown. Front, vertex and occiput brown.

Thorax: pronotum light yellow; mesonotum entirely clear light yellow, except the middle of the præscutum which has a prominent rounded, transverse, brown mark extending from the level of the pseudosutural fovea back to near the suture, the caudal margin of the mark produced backward in two small lobes, one on either side of the median line. Pleuræ clear light yellow. Halteres brown, extreme base of stem pale; knob less dark than the stem. Legs: coxæ and trochanters light yellow; femora, basal half light brown, apical half dark brownish-black; tibiæ and tarsi dark brownish-black. Wings: hyaline or nearly so; an indistinct brown band across the wing from the base of Rs to the end of 2nd Anal; a much darker brown band, broadest in front begins over the cross-vein *r* and extends back to Cu; outer end of cell 1st M_2 margined with brown; tip of wing brown, the inner end of this band distant from the outer end of cell 1st M_2. Venation, as figured (Fig. b.)

Abdomen, dark brown, the genitalia swollen. Hypopygium: (See fig. l.): 9th tergite, caudal margin strongly convex; pleural pieces very stout, at the apex with two short teeth; the inner margin produced caudad and entad in an obtuse tooth; viewed from the ventral aspect, with a stout apical appendage (a) inserted on the side of the pleura, below the apical teeth described above; it is narrowed at the ends, swollen on the inner face in the middle and bears numerous hairs at its tip; just entad of the base of the apical appendage is a rounded lobe (b); between the pleuræ arises what is apparently the guard of the penis, dark brown basally, apparently less chitinized apically (c), shaped as in the figure.

Holotype, ♂, Igarape-assu, Para, Brazil; Jan. 30, 1912. (H. S. Parish, coll.)

Type in Cornell University Museum.

It is probable that the body-colors, described above as brown are, in fresh specimens, jet black and presumably shiny.

The species belongs to the *polita* group and may be separated from its allies by the key under *sackeni*.

Teucholabis audax sp. nov.

Wings unbanded; body-color yellow; large, ♂, wing, 9.5-10 mm.

♂. Length, 11.3 mm.; wing, 9.7 mm.

Fore leg, femur, 8.2 mm.; tibia, 9.6 mm.; tarsus, 8.6 mm.

Middle leg, " 7.4 mm.; " 7.4 mm.; " 5.6 mm.
Hind leg, " 8.1 mm.; " 8.2 mm.; " 6.7 mm.

Head: rostrum yellowish-brown; palpi black; antennæ, first segment bright honey-yellow at the base, abruptly light brown; remainder of the antennæ dark brownish-black. Front very narrow, the eyes almost contiguous at the narrowest portion; front dark brown; the caudal portion of the vertex, and the occiput lighter, more yellowish.

Thorax: cervical sclerites elongated, brown. Prothorax very long, about as long as the mesonotal præscutum and cylindrical, broadest basally, narrowing cephalad to meet the narrow cervical sclerites; pronotum brownish-yellow. Mesothorax, præscutum medially bright orange-yellow; on the sides brown; in the middle of the sclerite, beginning near the anterior margin, broadest in front, narrowed to a point behind, is a dark brown mark; scutum pale yellow, a continuation of the præscutal pale median vitta, lobes brown, darkest laterally; scutellum bright orange; post-notum yellowish with indistinct brown stripes; pleuræ shiny orange-yellow with patches of grey bloom (possibly not normal). Halteres brown. Legs: coxæ and trochanters light yellow; femora pale yellow with the tip broadly brown, and with a brown post-medial annulus, most prominent on the hind legs; tibia dull yellow, indistinctly darker at the extreme tip; tarsi brownish-black; legs densely covered with long black hairs. Wings: hyaline, veins brown; veins C, Sc and R bright yellow; stigma rounded, dark brown, large; an indistinct brown cloud around the deflection of R_{4+5}. Venation, see figure d.

Abdomen: tergum light yellow, apical segments more brownish, hypopygium brown.

Holotype, ♂, Canal Zone, Panama, Central America. (C. H. Bath, coll.)

Type in U. S. National Museum Coll. (No. 15,126).

This vigorous species is the largest member of the genus in the American fauna. It may be readily recognized by its general yellow color (including abdomen) and its large size.

Teucholabis pleuralis sp. nov.

Wings unbanded: thorax light yellow with a dark, narrow pleural stripe; abdomen without metallic reflexions; femora yellow, brown at the tip.

♂ Length, 5 mm.; wing, 5.3 mm.

Middle leg, femora, 3 mm.; tibia, 2.7 mm.

Hind leg, " 4 mm.; " ,3.8 mm.

Head: rostrum and palpi dark brownish-black. Antennæ very dark brown. Front, vertex and occiput dark brown.

Thorax: prothorax light yellow; mesothorax: præscutum orange-yellow with a dark brown median mark, broadest anteriorly, beginning near the cephalic margin, becoming obsolete at about one-half the length of the sclerite; scutum and scutellum orange-yellow, the lobes of the scutum brownish on the antero-exterior angles; post-notum brownish-yellow with an indistinct brown median line. Pleuræ and sternum light honey-yellow, the former with a rather broad, dark brown band beginning on the cervical sclerites, running obliquely above the base of the fore coxæ, through the halteres, and becoming confluent with the dark color of the

abdomen. Halteres dark brown. Legs: coxæ and trochanters light yellow; femora light yellow, the apice broadly dark brown; tibia and tarsi brownish-black. Wings, subhyaline, with a distinct dusky tinge; stigma round, brown, its posterior margin not touching R_{2+3}. Venation: Sc rather long, that portion beyond the origin of Rs slightly longer than cell 1st M_2(discal); cross-vein *r* close to the tip of R_1; space on R_{2+3} before *r*, as long as the basal deflection of Cu_1; cell 1st M_2 very elongated, narrowed anteriorly; outer deflection of M_3 longer than cross-vein *m* (these two components making up the distal end of cell 1st M_2); basal deflection of Cu_1 slightly beyond the fork of M.

Abdomen: dark brown, not at all with metallic reflexions; two basal sternites yellowish.

Holotype, ♂, Aguna, Guatemala, Central America (Dr. G. Eisen, coll.)

Type in U. S. Nat. Mus. coll. (No. 15,125),

T. pleuralis is closest to *chalybeiventris* Loew[1] from the island of Cuba; it differs in its lack of metallic reflexions on the head and abdomen; prothorax yellow, not brownish; mesothorax with a conspicuous pleural stripe; femora not brownish-black except at the extreme tip; wings not pure hyaline, but distinctly suffused with darker. It is even more closely akin to the specimen which Williston[2] doubtfully referred to *chalybeiventris*, but no mention is made, in this description, of a pleural stripe. It is very probably the same species; Williston's specimen was from Cuernavaca, Morelos, Mexico.

Teucholabis parishi sp. nov.

Wings unbanded; color light yellow throughout; venation not like typical *Teucholabis*.

♂ Length, 5.2 mm.; wing, 4.1 mm.

Middle leg, femora, 2.6 mm.; tibia, 2.5 mm.

Hind leg, " 3.4 mm.; " 3.5 mm.

(Alcoholic) ♂.

Head: rostrum very short, pale; palpi also very short, the segments subequal, only about twice as long as broad, pale yellow. Antennæ, 16-segmented, segments 1 and 2 short, the second only a little more globular than the third, light yellowish; the apical segments apparently paler. Front broad; broader than the diameter of one eye; ommatidia of the eye large, coarse.

Thorax: light yellow, mesonotal præscutum with darker, orange, stripes (possibly brown in dry fresh specimens); the middle stripe is double, begins at the cephalic margin of the sclerite, ends just before the suture; the lateral stripes begin just behind the pseudo-sutural fovea, run caudad, crossing the suture, on the scutum represented by two spots on each lobe, the posterior one triangular; post-

[1] Loew; Wiener Entomol. Monatschr.; vol. 5, no. 2; p. 33, 34. (Feb. 1861) (*Rhamphidia*)

[2] Williston; Biologia Centrali-Americana; Diptera, vol. 1, supplement; p. 226 (Dec. 1900).

notum rather darker yellowish. Pleuræ, light yellowish, a dark spot under the base of the halteres, above the hind coxa; a clearer-defined, though smaller, spot on the propleuræ in the vicinity of the anterior spiracle; sternum light orange-yellow. Halteres, stem short, knob large; pale yellow. Legs, pale yellow; only the two terminal tarsal segments slightly darker. Fore legs very widely separated from the middle legs as in the *Antochini*. Wings: light yellowish; veins brown, those in the costal region rather brighter-colored, stigma very indistinct. Venation: (See fig. c.): Sc short ending before the fork of Rs; what seems to be a branch of R_{2+3} arises from R_{2+3}; I regard it as cross-vein *r*, although it is not complete and is very oblique in position (such as in *Paratropeza*). If this is regarded as a vein, R_2, then the radial cross-vein is absent and the genus would run down into the *Eriopterini;* I know of no genus, at present, that can receive it.

Abdomen: light yellow; on the sides of the 6th segment rather dark brown, and here with a conspicuous widened enlargment (possibly not normal). Hypopygium: (See fig. k, ka), 8th tergite short, narrower than either the 7th or 9th; 9th (a) tergite convex on the caudal margin, with a deep median notch. Pleural pieces (b) rather narrow, cylindrical, with the appendages at the end or on the ventral face; the outer angle of the pleura produced into a blunt knob (c); apical appendages two, the dorsal one (d), fleshy, inserted near the apex of the sclerite; the ventral one (e) arising from the ventral side, far down near the base of the pleura; the base strongly swollen, the tip chitinized bearing on the inner face, a strong tooth, swollen at the base and projecting inward; the tip, slender, bent inward. What seems to be the guard of the penis (f) is elongated, slender, not swollen, but pseudo-segmented near the tip.

Holotype: ♂, Igarape-assu, Para, Brazil. Jan. 30, 1912. (H. S. Parish, coll.) Type in Cornell University Museum.

The reference of this curious species to *Teucholabis* is provisional, only. It seems to me as though it might be considered one of the primitive forms of the genus. I take pleasure in naming this insect after its discoverer, Mr. H. S. Parish, the well-known collector and traveller.

Orimarga Osten Sacken

The following species is the second American form to be made known. The two species may be separated by the following key.

1. Thoracic pleuræ without silvery band; legs pale yellow; tip of femora, base and tip of tibia black; wings hyaline, extreme base dark yellow. (Southwest. U. S.) ..... *arizonensis* Coquillett[1]

   Thoracic pleuræ with a broad silvery-blue band; legs dark brown, uniform, wings suffused with darker. (Guatemala, Cent. Am.) ..... *argenteopleura*, sp. n.

[1] Coquillett, "New Dipt. from N. Am.;" Proc. U. S. Mus.; vol. 25; no. 1280; p. 83, 84 (1902)

Orimarga argenteopleura sp. nov.

Dark brownish black; pleuræ with a silvery-blue band; legs uniform dark brown.

♂, Length, 8.8 mm.; wing, 6.4 mm.; abdomen, 6.8 mm.

Fore leg, femur, 5 mm.; tibia, 5.3 mm.; tarsus, 5.1 mm.

Hind leg, " 5.4 mm.; " 5.5 mm.; " 4.2 mm.

♀ Length, 6.2 mm.; wing, 4.9 mm.

♂ Head: rostrum and palpi dark brownish-black; antennæ, basal segments dark, silvery-greyish pollinose; flagellar segments dark brownish-black. Front very pale blue, the vertex and occiput brown with a sparse bluish bloom; back of the eye, on the vertex, seven or eight very long dark hairs.

Thorax: mesonotum very dark brown without apparent dorsal stripes; a narrow bright silvery-blue stripe running along the extreme lateral edge of the thorax, beginning on the end of the prothoracic scutellum, continuing to above the wing-basis. Pleuræ dark brownish-black with a much broader silvery band extending from above the fore coxa back to above the hind coxa. Halteres, stem light brown, knob dark brown. Legs: coxæ, trochanters and extreme base of the femora light brown, the remainder of the legs dark brown. Wings: uniformly suffused with dark; veins almost black; extreme apice of the wings, in the ends of the radical cells, still darker brown. Venation: (See fig. f.): Rs angulated at its origin; cross-vein *r* at the tip of R_1; cross-vein *r-m* distad of the level of *r*; basal deflection of Cu_1 at about one-third the length of Rs.

Abdomen very elongated, dark brownish-black.

♀ Almost exactly like the ♂, but much smaller.

Holotype, ♂ Trece Aguas, Cacao, Alta V Paz, Guatemala, April 24. (Barber and Schwarz, coll.) Allotype, ♀. Type-locality, April 26, (Barber and Schwarz).

Types in the U. S. National Museum coll. (Cat. No.)

Ceratocheilus Wesché

1910. *Ceratocheilus* Wesché; Journ. Linn. Soc. Zoöl.; vol. 30; p. 358.

1912. *Neostyringomyia* Alexander; Canad. Ent.; vol. 44; p. 85.

The genus *Ceratocheilus* was erected by the late Mr. Wesché for a species which he described as new (*winnsampsoni*), but which Mr. F. W. Edwards has since determined as being conspecific with the *Styringomyia cornigera* of Speiser. Neither Mr. Wesché's paper, nor Mr. Edward's extremely valuable article (Annals and Magazine Nat. Hist.; series 8, vol. 8, p. 279–283; Aug. 1911) were available to me until after my paper was issued, wherein I erected the subgenus *Neostyringomyia*, using exactly the same type, *cornigera* Speis; consequently my name falls as a rank synonym of

Ceratocheilus. All of the species hitherto described are African. *C. cornigerum* Speiser has spotted wings but *C. gilesi* Edwards has hyaline wings like the New World form.

The discovery of this genus in America is very interesting and we may likewise expect *Styringomyia* to turn up in the Neotropical fauna, when further collections are made.

Ceratocheilus americanum sp. nov.

Wings unspotted; thorax with dorsal stripes.

♀. Length, 10.5 mm. (excluding rostrum); wing, 5.3–6.2 mm.; rostrum, 5.6 mm.

Fore leg, femur, 5.5 mm.; tibia, 5.7 mm.; tarsus, 5.2 mm.
Middle leg, " 5.4 mm.; " 6 mm.; " 4.8 mm.
Hind leg, " 5.8 mm.; " 6 mm.; " 4.5 mm.

The measurements of the legs and body appertain to the ♀ with the largest wing (6.2 mm.), the paratype.

Head: rostrum and palpi dark brown; antennæ dark brown; front brown; vertex and occiput brown, with a greyish bloom behind; genæ grey. Eyes brilliant metallic green. The *corniculus* represented by a rounded plate above the base of the antennæ.

Thorax: collare very dark brown; prothorax concealed from above by the over-projecting mesonotum, only the lateral ends of the scutellum, which shows above the humeri as a rather square brown knob on either side. Mesothorax, præscutum very light buff-colored with dark brown longitudinal stripes; the middle one is broad, begins at the cephalic margin of the sclerite and continues back almost to the suture; on its caudal portion it is indistinctly divided by a pale median vitta; lateral stripes begin behind the pseudosutural foveæ, continue back to the scutum where they cover the lobes; extreme lateral edge of the præscutum buff-colored; scutum dark brown except the pale median depression; scutellum pale greyish-buff; post-notum thinly greyish with indistinct brown stripes on the sides. Pleuræ greyish with brown patches on the sides of the sternum; on the mesopleuræ, just before the wing basis and another just behind the fore coxa; sternum buffy-grey. Halteres, stem light-colored, knob dark brown. Legs: coxæ and trochanters yellowish-brown; femora light brown; tibiæ and tarsi darker brown. Wings: subhyaline, unspotted; veins dark brown. Venation: (See fig. e.); Sc ending just beyond the origin of Rs; Rs oblique, about as long as R_{2+3}; R_1 beyond Rs about as long as the deflection of R_{4+5}. Basal deflection of Cu_1 before the fork of M.

Abdomen: tergum, sclerites dark brown, from the third outward with the basal-fourth light yellowish; valves of the ovipositor long and slender (See fig. j.). Sternites dull yellow, the extreme tip of segments one to four brown; a narrow, indistinct, linear, brown, median stripe.

Holotype: ♀. Culebra, Panama, Central America. Feb. 16, 1902. (W. M. Black, coll.) Paratype, ♀, Igarape-assu, Pará, Brazil. Jan. 30, 1912 (H. S. Parish, coll.)

Type in U. S. Nat. Mus. coll. (No. 15,127). Paratype, (alcoholic), Cornell University Museum.

The paratype does not differ except in such respects as might be caused by its immersion in alcohol.

Toxorrhina Loew

The Neotropical material that I have before me numbers 30 specimens referable to four species. *T. brasiliensis* Westwood is well-defined, but no specimens in the collection agree with Loew's description of *fragilis*. It is probable that it is an insular form, limited to the Antilles; it will be easy to recognize by its light-colored legs with darker femoral and tibial apices. My material is all continental and ranges from Mexico to Eastern Brazil.

Of the Nearctic species, I have taken *muliebris* O. S. by the hundreds, and have seen several specimens of *magna* O. S. from Georgia. The coloration of these two species is very constant and it is for this reason that I do not hesitate to describe three new tropical forms based largely on color-characters. Venation in the genus is rather inconstant, especially as regards the position of the basal deflection of Cu_1 (*pars ascendens* of Bergroth; *great cross-vein* of Osten Sacken).

In the vicinity of Para, Brazil, Mr. H. S. Parish took four species of *Toxorrhina*, including the large *brasiliensis* Westw. It would seem from this, that the tropics is the principal home of the members of this genus.

KEY TO THE NEOTROPICAL TOXORRHINÆ.

1. Tibiæ darker at the tip 2
   Tibiæ uniform in color throughout 3
2. Femora uniform throughout; tibiæ *black* at the tip. (Eastern Brazil) *brasiliensis* Westw.[1]
   Femora darkened at tip; tibiæ (probably) not *black* at tip. (Porto Rico) ..... *fragilis* Loew.[2]
3. Color light yellow; basal segments of antennæ lighter than the flagellum; abdominal sclerites dark at tip, except the sternites which are uniform yellow. (Eastern Brazil) ..... *flavida*, sp. n.
   Color brown; antennæ unicolorous; abdominal sclerites uniform or dark at base and tip 4

[1] Westwood, Ann. Soc. Entomol. France; vol. 4, p. 683 (as *Limnobiorhynchus*) (1835)
[2] Loew, Linnæa Entomol.; vol. 5, p. 401; pl. 2; f. 16, 17, 18, 22. (1851)

4. Small species (Length, ♂ 5 mm.; wing less than 5; rostrum less than 4 mm.); abdominal sclerites uniform throughout, the apices not darkened. (Eastern Brazil) ..... *meridionalis*, sp. n.
Larger species (Length, ♂, 6–6.5 mm.; wing more than 5; rostrum over 5 mm.); abdominal sclerites pale in the middle but dark at the bases and apices of the sclerites; apice of the sternites narrowly darkened. (Mexico—Eastern Brazil.) ..... *centralis* sp. n.

Toxorrhina flavida sp. nov.

Light yellow; basal segments of the antennæ paler than the flagellum; ♀ ovipositor with very slender acicular valves; basal approximation of Cu and 1st A slight.

♀. Length, 6, 6.7, 8.2 mm. Wing, 4.8, 5, 5.4 mm. Rostrum, 3.4, 3.7, 3.8 mm.
Fore leg, femur, 3.4, 3.8, 4 mm.; tibia, 4, 4.2, 4.5 mm.
Middle leg, " 3.6, 4, — mm.; tibia, 4.5, 3.6,— mm.
Hind leg, " 3.3, 3.6, 4.2 mm.; tibia, 3.5, 3.8, 4 mm.
Upper valve of ♀ ovipositor, 1.9, 2.0 mm.

Head: rostrum rather short, medium brown; antennæ, basal segments varying from light yellow to yellowish-brown; flagellar segments dark brownish-black. Front, vertex and occiput yellowish-grey.

Thorax: cervical sclerites rather dark brown; mesonotum, præscutum rich yellowish-brown, with an indistinct narrow paler median line which becomes obsolete before the suture and in some specimens is bordered on either side by a very narrow brown line; lateral margins of the sclerite dull yellowish, especially bright in front of the pseudosuture; scutum, lobes brownish-yellow, median line greyish; scutellum greyish-white suffused with brown, post-notum dull yellow tinged with brown caudally. Pleuræ uniformly dull orange-yellow. Halteres, stem yellow, knob slightly darker, tinged with brown. Legs: coxae and trochanters yellow, the latter rather tinged with brown; femora dull brownish-yellow, not darkened at the tip; tibiæ uniform yellowish-brown; tarsi brown. Wings, veins light brown, in costal region more yellowish, subhyaline. Venation (See fig. h.) Sc_1 ending about opposite the origin of Rs; deflection of M_{1+2} much shorter than that segment of M_{1+2} between cross-veins *r-m* and *m*; cell 1st M_2 elongated; basal deflection of Cu_1 rather near the fork of M. Basal approximation of Cu and 1st A slight, about one-fourth of Cu beyond the arculus.

Abdomen: tergum rich dull yellow, the caudal margin of each sclerite broadly brown; sternum uniform light yellow. Ovipositor of the ♀, upper valve, base slender, tip acicular, very elongate; lower valves likewise very slender.

Holotype, ♀ Igarape-assu, Para, Brazil, Feb. 1, 1912. (H. S. Parish, coll.) Paratype, ♀ Igarape-assu, Para, Brazil, Feb. 3, 1912. (H. S. Parish, coll). Paratype, ♀ Igarape-assu, Para, Brazil; Feb. 7, 1912. (H. S. Parish, coll.) Paratype, ♀ Igarape-assu, Para, Brazil; Feb. 4, 1912. (H. S. Parish, coll.)

Types in Cornell University, except paratype No. 3, in author's collection.

Toxorrhina meridionalis sp. nov.

Brown; antennæ uniform in color; abdomen uniformly light brown; ♀ ovipositor with the lower valves stout, blade-like; basal, approximation of Cu and 1st A more extensive.

♂. Length, 4. 8 mm.; wing, 4.6–4.8 mm.; rostrum, 3.7 mm.
Fore leg, femur, 3–3.25 mm.; tibia, 3.85–4 mm.
Middle leg, " 3.2–3.4 mm; tibia, 3.5–3.6 mm.
Hind leg, " 3.5–4 mm.; " 3.8 mm.
♀. Length, 6 mm.; wing, 5.1 mm.; rostrum, 4.2 mm.
Fore leg, femur, 3.2 mm.; tibia, 4.1 mm.
Hind leg, " 3.5 mm.; " 3.6 mm.
Upper valve of ♀ ovipositor, 1.3 mm.

Head: rostrum brown; antennæ dark brownish-black, including the basal segments. Front, vertex and occiput greyish, with two indistinct brown lines on the sides of the vertex.

Thorax: cervical sclerites dark brown; mesonotum, præscutum, dark brown darkest medially, paler, almost yellow, before the pseudosuture and along the margins of the sclerite; in some, the median stripe is separated from the lateral by paler; near the suture, with the appearance of two narrow, dark brown lines; scutum, lobes dark brown, the depression between them greyish; scutellum and post-notum brown with a sparse grey bloom. Pleuræ dark brown with a sparse greyish bloom, the extreme dorsal portions of the pleuræ are darker, producing an indistinct dorsal pleural stripe. Halteres brown, extreme base of stem rather paler. Legs: coxæ and trochanters, brown; femora, tibiæ and tarsi dark brown, not darker at the tips.

Wings: subhyaline, veins brown: Venation (See fig. g.): Sc_1 ending opposite the origin of Rs; deflection of M_{1+2} a little shorter than that segment of M_{1+2} between cross-veins *r-m* and *m*; basal deflection of Cu_1 situated far before the fork of M; basal approximation of Cu and 1st A rather extensive, about two-fifths the length of Cu beyond the arculus.

Abdomen: segments dark brown without distinct darker markings on the incisures. Ovipositor of the ♀, upper valve, base not strong, the tip slender but relatively short; lower valve, very broad, almost as wide as the base of the upper valve.

Holotype, ♂ Igarape-assu, Para, Brazil; Jan. 26, 1912 (H. S. Parish). *Allotype*, ♀, Igarape-assu, Para, Brazil, Feb. 1, 1912 (H. S. Parish). *Paratype* 1; ♂ Igarape-assu, Para, Brazil; Feb. 4, 1912 (H. S. Parish). *Paratype* 2; ♂ Igarape-assu, Para, Brazil; Feb. 4, 1912 (H. S. Parish).

Types in Cornell University, except paratype No. 2, in author's collection.

Toxorrhina centralis sp. nov.

Brown; antennæ uniform in color; abdomen with base and tip of each sclerite dark; ♀ ovipositor with long slender valves; basal approximation of Cu and 1st A moderate.

♂ Length, 6.6–7.2 mm.; wing, 6.2 mm.; rostrum, 5.1 mm.
Fore leg, femur, 4.8 mm.; tibia, 5.3 mm.
♀ Length, 7.2–8 mm.; wing, 5.1–6.3 mm.
Middle leg, femur, 4.1 mm.; tibia, 4.6 mm.
Hind leg, femur, 3.8–4.7 mm.; tibia, 4.2–4.5 mm.
Upper valve of ♀ ovipositor, 2.0 mm.

Head: rostrum dark brown; antennæ uniform dark brown. Front, vertex and occiput light grey, suffused with brown.

Thorax: præscutum rich light brown without apparent paler stripes; sides of the sclerite broadly pale buff; scutum similar, brown; scutellum and post-notum with a sparse greyish bloom. Pleuræ light brown. Halteres light brown, stem paler. Legs uniform light brown.

Wings subhyaline, veins light yellowish-brown. Venation: (See fig. i.): Sc ending opposite origin of Rs, basal deflection of M_{1+2} about equal to that segment of M_{1+2} between cross-veins *r-m* and *m*; basal deflection of Cu_1 usually at, or very close to, the fork of M; basal approximation of Cu and 1st A moderate, about one-third of the length of Cu beyond the arculus.

Abdomen, tergum, sclerites light brownish-yellow, the apice and basis of each sclerite broadly brown, each band as broad as the median pale band; sternum light yellow, the apical fifth of each sclerite brown. Ovipositor of the ♀, upper valve, very long and slender, lower valve also slender, but stouter than the upper valve.

Holotype: ♂ Surinam (H. Polah). Allotype, ♀ Surinam, (H. Polah). Paratype 1, sex? Cordoba, Mexico; April 1, '08 (Fred'k Knab). Paratype 2 ♀, Cordoba, Mexico; May 8, '08 (Fred'k Knab). Paratype 3, ♀, Cordoba, Mexico, May 8, '08 (Fred'k Knab). Paratype 4, ♂, Rio Dulce, Guatemala; Mar. 21, '06 (Schwarz and Barber). Paratype 5, ♀, Cacao, Trece Aguas, Alta V. Paz, Guatemala; April 14, '06 (Schwarz and Barber). Paratype 6, ♂, Steamship "Algiers," second day out from Port Limon, Costa Rica; June 20, 1903 (Dr. J. B. L. Layton). Paratype 7, ♀, Bocas del Toro, Panama; Sept. 28, '03. (P. Osterhout). Paratype 8, Paramaribo, Dutch Guiana (Miss K. Mayo). Paratype 9, ♀ Igarape-assu, Para, Brazil (H. S. Parish).

Types in the U. S. Nat. Mus. coll. (No. 15,128).

Paratypes in U. S. N. M., except No. 4 in author's collection, No. 8, in Acad. Nat. Sci. Phil. and No. 9 in Cornell University.

This species exhibits some differences in coloring and other variations from the type-description but I am quite certain that but one species is included. Most of the specimens show clearly the dark basis and apice of the abdominal tergites. Some variation exists in the position of the basal deflection of Cu_1, in relation to the fork of M. In most specimens it is close to, or at, the fork; in some rather far proximad of the fork; in paratype No. 9 it is distad, underneath cell 1st M_2. A few examples show an open 1st M_2, occasionally one wing exhibiting this character while the opposite wing is quite normal.

Explanation of the Plate 2.

Fig. a. Wing of *Teucholabis sackeni*, sp. n.
" b. " " *Teucholabis pulchella*, sp. n.
" c. " " *Teucholabis parishi*, sp. n.

Fig. d. Wing of *Teucholabis audax*, sp. n.
" e. " " *Ceratocheilus americanum*, sp. n.
" f. " " *Orimarga argenteopleura*, sp. n.
" g. " " *Toxorrhina meridionalis*, sp. n.
" h. " " *Toxorrhina flavida*, sp. n.
" i. " " *Toxorrhina centralis*, sp. n.
" j. Ovipositor of *Ceratocheilus americanum*, sp. n.
" k. Hypopygium of ? *Teucholabis parishi*, sp. n.
Dorsal aspect. (a) 9th tergite; (b) pleura; (c) apice of pleura; (d) dorsal apical appendage; (e) ventral apical appendage,; (f) guard of the penis.
" ka Ventral apical appendage, (enlarged).
" l. Hypopygium of *Teucholabis pulchella*, sp. n. Dorsal aspect. (a) apical appendage; (b) lobe; (c) guard of the penis.

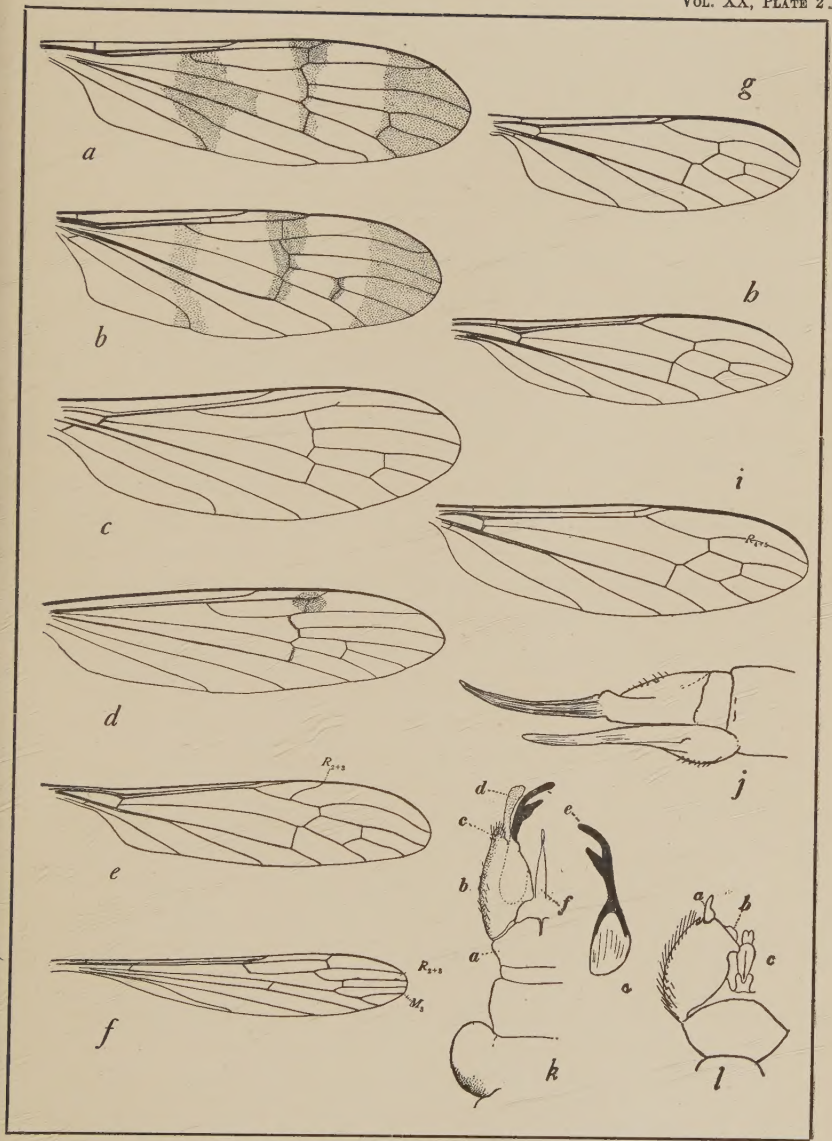
BOOK NOTICES.

Comstock, J. H. The Spider Book.

A Manual for the study of the spiders and their near relatives, the scorpions, pseudoscorpions, whip-scorpions, harvestmen, and other members of the class Arachnida found in America north of Mexico, with analytical keys for their classification and popular accounts of their habits. pp. XV, 721, figs. 770. Doubleday, Page & Co., Garden City, N. Y. (1912).

This large octavo volume deals with an extensive and very interesting group of Arthropods which have hitherto been given very scanty attention outside of scientific journals. In fact it is the first attempt to present in a single book anything like a complete account of the American Spiders and their allies from the combined standpoint of anatomy, taxonomy and ethology.

The general arrangement is very similar to that followed in Prof. Comstock's well-known Guide to the Study of Insects, although the volume conforms at least in binding and typography to the earlier members of the "Nature Series" issued by the same publishers. Owing to the smaller extent of most of the groups of Arachnida, their classification has in many cases been carried down to the genera or beyond, in place of the family classification of the insect manual. The mites and ticks have, unfortunately been treated very briefly, although there are complete tables for the specific determination of scorpions, pseudoscorpions, phalangiidæ, etc. The true spiders are treated with very general completeness



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as regards their taxonomy except in some of the more difficult and extensive groups and a great many species are figured by photographs as well as by line drawings illustrating their more minute structure; especially striking are the many photographic illustrations of the webs of various species. These are exceedingly good, and in spite of the great difficulty which attends the reproduction of such fine details few have been treated by the hands of the "retoucher."

From a scientific standpoint, the most valuable portion of the book is a minute account of the comparative structure of the palpi of male spiders, accompanied by numerous figures. The remainder of the external and internal anatomy is given far less space proportionately, but nevertheless rather fully treated. The ethological material is presented very generally in one chapter on "The Life of Spiders," and throughout the text are references to individual peculiarities of many of the species as these are treated in their systematic order. At the end is a brief general bibliography and an index.

Although this volume will doubtless appeal to a much smaller group of readers than the "Manual" it should serve the worthy purpose of fostering an interest in a neglected group of Arthropods, and it deserves a wide circulation.

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